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AMERICAN SUPPLEMENT

TO

ENCYCLOPÆDIA BRITANNICA.

(NINTH EDITION.)

A DICTIONARY

OF

ARTS, SCIENCES, AND GENERAL LITERATURE.

ILLUSTRATED.

VOLUME III.

PHILADELPHIA AND NEW YORK.
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Vol. III.

PREFATORY NOTE TO VOLUME III.

THE Third Volume of the American Supplement to the *Encyclopœdia Britannica* has been prepared on the same general plan which had been laid down at the outset of the work. Both the previous volumes have been cordially received by an ever-widening circle of subscribers, who have frequently assured the Publishers of their gratification at the successful prosecution of this important undertaking. Critics of the highest rank in both hemispheres have passed encomiums on the former volumes. It has been the aim of the Publishers and Editors to continue to deserve these praises. For this purpose, not only have valued contributors to the former volumes been retained, but additions have been made to their number as the subjects to be treated appeared to demand. Attention is, therefore, called to the list of contributors to the present volume, as indicating at a glance the value of the present portion of a work, whose reputation has already been established on a firm basis.

As in the former volumes especial regard has been had to subjects relating to the United States, whether in biography, history, geography, science, politics, or religion. The development of the resources of our vast and rich inheritance has been treated in various articles with such fulness as the pressure of other important topics would allow. The social problems which have arisen from the rapid development of the country, and from the changes in transportation and industries, have been carefully attended to. In subjects even of a wider range care has been taken to discuss the questions on the lines most directly affecting American interests.

While in statements of fact and matters of general information in science and philosophy it has been the uniform rule of the Editors to avoid repetition of what is contained in the *Encyclopœdia Britannica*, it has been felt that writers on certain topics in that valuable work had prepared articles which, however able, were so one-sided that fairness and justice demanded the presentation of the opposite views. This has been done, not only in case of certain subjects relating to the Bible, but in regard to Free Trade, Homœopathy, Indulgences, and some topics of less prominence. In every such case the statements of this work should be compared with those under the corresponding title in *Encyclopœdia Britannica*, before drawing conclusions.

Efforts have not been wanting to maintain the high standard of typographical and mechanical excellence which has hitherto characterized this work. Indeed, the Publishers have felt justified in going to greater expense in providing illustrations for the articles in this volume, hoping thereby not only to enrich the appearance of the volume, but to make still clearer the statements of the text.

With the hope of receiving renewed expressions of approval the present volume is respectfully submitted to the judgment of its final arbiter—an impartial public.

LIST OF CONTRIBUTORS.

VOLUME III.

This list embraces the names of those contributors whose names are signed (by their initials) to articles in the present volume.

Where two or more contributors have the same initials, a distinction has been made in printing them, which will enable the reader to assign to each his own work.

The writers whose names are marked with an asterisk (*) have exercised more or less editorial supervision in their respective departments.

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AMERICAN SUPPLEMENT
TO
ENCYCLOPÆDIA BRITANNICA.

FAED, John, a Scotch painter, was born at Burlay Mill, in the stewartry of Kirkcudbright, in 1820. He was the son of a millwright and in early boyhood showed a decided taste for art. In 1841 he removed to Edinburgh, where his talent was soon recognized and he was chosen an associate of the Royal Scottish Academy. Among his early pictures are The Cotter's Saturday Night (1851), The Household Gods in Danger (1856), The Scottish Justiciary (1857). He began to exhibit at the Royal Academy, London, in 1861, sending in that year Queen Margaret Refusing to Deliver the Keys. In 1862 he removed to London, where he has since resided, though he exhibits also in Edinburgh. His later pictures include The Gamekeeper's Daughter (1871), The Hiring Fair (1871), The Morning before Flodden (1874), Blenheim (1875), Goldsmith in his Study (1877), The Old Basket-Maker (1878). He is most successful in domestic and rural scenes of a cheerful character. His popularity has been increased by the excellent engraving of some of his paintings by his brother James.

FAED, Thomas, a Scotch painter, brother of the preceding, was born at Burlay Mill, in 1826. He was likewise early drawn to art and in 1843 was invited to Edinburgh by his brother John, who was then rising into notice. In 1849 Thomas exhibited his well-known painting of Sir Walter Scott and his Friends at Abbottsford, which secured his admission as an associate of the Royal Scottish Academy. In 1851 he exhibited at the Royal Academy, London, and in the next year removed to that city. Among his paintings executed about this time are Burns and Highland Mary (1852), The Patron's Visit to the School (1852), Morning—Reapers Going out (1854), and above all The Mitherless Bairn (1855), which still continues the unsurpassed type of his best works, though he has added a long series of pathetic pictures of Scotch domestic life and has occasionally ventured into other fields. It has been truly said that Thomas Faed has done for Scottish art what Burns did for Scottish song; he has made it attract universal interest and command universal respect. His pictures are generally elaborate in detail and full of sentiment which can be appreciated by all classes. They may sometimes be criticised as aiming at too much, as intended to tell a story rather than allowed to depend for their success on the strictly limited resources of the painter's art. Within his own field, the vivid delineation of Scotch humble life, Faed is unsurpassed.

FAIDHERBE, Louis Léon César, a French general, statesman, and archæologist, was born at Lille, June 3, 1818. He studied at the Ecole polytechnique in 1838, passing to Metz in 1840, and served as a military engineer in Algeria and the West Indies. In 1852 he went to Senegal, of which he was made governor in 1854. In 1863 he was promoted to be general of brigade, and in 1865 he was recalled to France at his own request. From 1867 to 1870 he had command of Bona in Algeria. When M. Gambetta was reorganizing the armies, Gen. Faidherbe offered his services, and in November, 1870, was appointed general of division and commander-in-chief of the Army of the North. A month later he fought the battle of Pont-Noyelles, and thus relieved Havre from siege. After movements in various directions he was compelled to retire towards Cambrai, where he remained with his army till after the signing of the armistice. He was elected to the national assembly in February, 1871, and again in July as a Republican, but soon resigned. He was afterwards sent on a scientific expedition to Upper Egypt, where he studied the Libyan monuments and inscriptions, which form the subject of some of his publications. For several years he was counsellor-general of the North for the canton of Lille, and in January, 1879, he was elected to the senate, though, on account of his infirm health, he was carried there in a reclining chair. He is grand-chancellor of the Legion of Honor. Gen. Faidherbe has published several works, some relating to his military career and the countries he has governed, and others on linguistic and archæological topics.

FAIR. See Industrial Exhibitions.

FAIRBAIRN, Patrick (1805–1874), a Scotch divine, was born at Greenlaw, Berwickshire, Jan. 10, 1805. He graduated at the University of Edinburgh, held several pastoral charges, and was made professor at Aberdeen University. In 1856 he was called to be principal of the Free Church Theological College at Glasgow, with the professorship of systematic theology and New Testament exegesis. He died at Glasgow Aug. 6, 1874. His works are valuable contributions to theological literature. They comprise *Typology of Scripture* (1847; 6th ed. 1880); *Ezekiel* (1851; 4th ed. 1876); *Prophecy* (1856; 2d ed. 1866); *Hermeneutical Manual* (1858); *Pastoral Epistles* (1874); *Pastoral Theology* (1875). He also edited *The Imperial Bible Dictionary* (1867).

FAIRBANKS, Erastus (1792–1864), an American governor, was born at Brimfield, Mass., Oct. 28, 1792. He had a common school education and at the age of twenty settled in St. Johnsbury, Vt. In 1825 he formed a partnership with his brother Thaddeus, who in 1830 invented an improved scale for weighing heavy bodies. This platform scale, patented in 1831 and intended chiefly as a hay scale, was gradually improved, and its sale spread so widely that the whole town of St. Johnsbury shared in the resulting prosperity of its manufacturers. In 1836 Erastus was elected to the legislature, and in 1852 and 1860 he was chosen governor of Vermont, but served without salary. He showed great energy in raising troops for the Union army. He was remarkable for his piety and culture as well as for his diligence and business success. He died at St. Johnsbury, Vt., Nov. 20, 1864.

FAIRCHILD, Lucius, an American general, was born at Franklin Mills, Ohio, Dec. 27, 1831. He settled in Iowa and in June, 1861, became lieutenant-colonel of the Second Iowa infantry. In August he was made brigadier-general of volunteers. He served in Virginia under McClellan and Pope. On leaving the army he settled in Wisconsin, where he was elected secretary of state in 1864. He was governor of Wisconsin 1866–70, and was afterwards consul at Liverpool.

FAIRFAX FAMILY. Henry Fairfax of Tolston, the ancestor of the American Fairfaxes, was the second son of Henry, fourth Lord Fairfax. William Fairfax, the second son of Henry of Tolston, was the first of the family that came to America, where he arrived in 1717. He was collector of the customs at Salem, Mass., in 1725. In 1734 he removed to Virginia as agent of his cousin Thomas, the sixth Lord Fairfax, and built Belvoir on the Potomac, about two miles from Mt. Vernon, on the opposite side of the river. He was lord-lieutenant of Fairfax county, collector of South Potomac, and president of the council of Virginia. His eldest son, George William Fairfax of Belvoir in Virginia and Tolston in Yorkshire, was born in the Bahamas in 1724, and married in 1748 Sarah, daughter of Col. Wilson Cary of Ceeleys, near Hampton, Va. George William was the companion of Washington on his first surveying-tour, employed by Lord Fairfax of Greenway Court. He inherited Tolston from his uncle Henry, and went to England in 1773, passing in the Thames, on its way to America, the tea which caused the Revolution. When the American war broke out he received no more remittances, and was obliged to sell Tolston. He died at Bath, April 3, 1787, leaving his estates to his nephew, Ferdinando.

Thomas, the sixth Lord Fairfax, was born in 1690. Educated at Oxford, he possessed a cultivated literary taste, contributed to the *Spectator*, and was a man of wit and fashion ; his bow was the most elegant at the court of Queen Anne, and he was one of the brightest ornaments of the famous Kit-Kat Club. He inherited from his mother, who was the daughter of Lord Culpeper, governor of Virginia between 1680–83, immense estates in that province, amounting in all to about 6,000,000 acres of land. A cruel disappointment in love drove him from the brilliant scenes where he had shone so long, and he sought in the wilds of Virginia a refuge for his wounded heart. He established himself at Greenway Court, near where Winchester now stands, and passed the last thirty-five years of his life in hunting, fishing, and out-door amusements.

Brian Fairfax, of Mt. Eagle in Virginia, the eldest son of William of Belvoir by his second wife, Deborah Clarke, was born in 1737. In 1759 he married Elizabeth, daughter of Col. Wilson Cary. His wife died in 1788, and he then entered holy orders. He was the rector of Christ Church in Alexandria, where Washington had a pew, and at the funeral of the latter he was the chief mourner. After the death of Lord Fairfax of Greenway Court and his brother Robert, the seventh Lord Fairfax, Rev. Brian Fairfax went to England and was recognized in May, 1800, by the House of Lords as the eighth Lord Fairfax, but he never assumed the title. He returned to America, and died at Mt. Eagle in August, 1802. He was succeeded by his eldest son, Thomas Fairfax of Vaucluse, a beautiful seat about three miles from Alexandria. It was situated in the midst of a park of grand old oaks, all of which were destroyed during the Civil War. Thomas Fairfax was born in 1762, and spent his life in superintending his paternal estates on the Potomac, and in exercising a genuine old Virginia hospitality. The family title is still vested in the American Fairfaxes, the tenth Baron Fairfax being John Contee Fairfax of Northampton, Prince George's co., Md.

FAIR OAKS, a place in Henrico co., Va., seven miles E. of Richmond, having a station on the Richmond and York River Railroad. Here a battle was fought, May 31 and June 1, 1862, between Gen. G. B. McClellan's army, which had advanced from Yorktown, and a Confederate force under Gen. J. E. Johnston. The left wing of the former, comprising two corps under Gens. E. D. Keyes and S. Heintzelman, had crossed the Chickahominy about a week earlier. The creek here flowed through a heavily timbered swamp, which was a serious obstruction to the passage of artillery. Bottom's Bridge was the only practicable means of communication between the right wing, which stretched for twenty miles on the east bank. Johnston on May 30 ordered an attack to be made the next day at dawn on Keyes' corps, which was six miles from the bridge. But a heavy rain prevented this plan from being executed. After 1 P. M. Gen. D. H. Hill came upon some troops of the other Union corps and compelled them to retire within their intrenchments. The firing attracted McClellan's attention, and he ordered Gen. Sumner to cross to Heintzelman's relief. Meantime the Union Gen. Couch had joined in the fight, and though separated from the main part of his own division determined to hold his position near Fair Oaks. At 4 P. M. Sumner came to his relief and endeavored to open up communication with Heintzelman. The Confederate charges were repulsed, and late in the day Gen. Johnston being wounded his command devolved on Gen. G. W. Smith. The Union troops under Hooker and some batteries of Sedgwick's division came up, but the divisions of Franklin and Porter, 35,000 men in all, were allowed to remain on the east side throughout the next day. With dawn on June 1 the Confederates renewed the attack, chiefly on Richardson's division, but after an hour's fighting fell back. Meantime Hooker and Sickles had come into position to assist Richardson, who then charged with the bayonet. The Confederates retreated in confusion to Richmond, and the Union troops regained all they had held on May 30. Their advanced pickets were within five miles of Richmond, and had Gen. McClellan ordered up his troops, which had not yet been engaged, he might readily have entered that city. This alone was wanting to render the victory complete, but the opportunity passed and never returned. The Union loss is officially stated at 890 killed, 3627 wounded, 1222 missing. The Confederate loss is estimated at 6500.

FAITH. This word is used theologically for the form of belief in God and divine things which a man may hold. It is often confined to the philosophical scheme of religion to which he gives an intellectual assent. In this way we speak of the Mohammedan, Buddhist, or Christian faith. It is also used in a more spiritual way for a heart-embrace of God himself, according to the individual conception of God.

In the Christian Scriptures faith is an adherence of the soul to the Lord Jesus Christ, from which union spring all Christian graces. Yet even in the Scriptures the word is used in a more general sense as indicating a firm reliance on God.

The *Rule of Faith* is a phrase expressive of the authoritative guide to the soul in the matter of faith. With some Christians it is the Church, with others the Bible, with others again the Church and Bible united. With Mohammedans it is the Koran. With many it is a priesthood. With many others it is the "inward light" of the conscience.

In the New Testament faith is united to hope and love as forming a trio of graces which abide forever. (1 Cor. xiii. 13.)

Saving Faith is that kind and degree of faith which is necessary to the soul's salvation from sin and eternal death. It is opposed to both an intellectual faith ("the devils believe and tremble," James ii. 19) and a speculative faith.

A *matter of faith* is sometimes contrasted with a matter of practice.

Degrees of faith have regard to the intensity of conviction and corresponding life.

FAITH-CURE is the name given to the doctrine founded on James v. 14, 15, that any one who is diseased may be cured by using the method prescribed in that passage. The holders of the doctrine declare that the passage is not to be confined to the apostolic age, or to the so-called "age of miracles," but is a promise for all time. In practice, however, they do not adhere to all the requirements of the passage. They do not "call for the elders of the church," but *go* to a *single* elder. Many faith-cure stations have been established in America, and multitudes flock to them, but without such results as have been convincing to the public mind. The believers in the system use prayer and oil-anointing, and forbid any use of medical means.

The objections to the doctrine are (1) that no clear evidence of a cure by this method has been furnished; (2) that it puts aside the use of means approved by God-given reason; and (3) that it asserts the continuance of miraculous power in the church, against which is all the evidence.

A fourth objection might be added, that it makes the matter of the body too prominent above the condition and needs of the soul.

FAITHFULL, Emily, an English philanthropist, was born at Headley, in Surrey, 1835—the daughter of a clergyman. In early life she left the dissipations of the fashionable world of London, and devoted herself to the task of improving the condition of working-women. She began her labors as a member of the Social Science Association, learned the art of type-setting, and in 1860 established the Victoria Press, a printing-office where women were the only compositors. The publication of a handsome book, called *Victoria Regia*, led to Miss Faithfull's appointment, in 1862, as printer and publisher to the queen. She gave great attention to sanitary questions, and won a high reputation as a lecturer in England, and also in the United States, which she visited in 1872–73, and again in 1883–84. Among her writings are many tracts and pamphlets; *A Reed Shaken with the Wind*, a novel of social life (1873); *Change upon Change* (1868), and other works.

See Vol. IX. p. 3 Am. ed. (p. 1 Edin. ed.).

FALCON, a genus of the family *Falconidæ*, or diurnal birds of prey. All the members of the group *Falconinæ*, comprising several genera, are often called falcons, but the true falcons are restricted to the genus Falco. Of these there are more than 50 species, whose distinguishing feature is a strong, projecting tooth, behind a notch in the edge of the upper mandible. They are birds of medium or small size, one being no larger than some sparrows, yet in build they are compact and powerful, and are bolder in proportion to their size than any other birds of prey. The wings are strong, long, and pointed, the power of flight great, and the prey taken by sudden and fierce assault. It is their habit to fly at lofty altitudes, and descend vertically on their prey, which consists of smaller birds, and of small land animals.

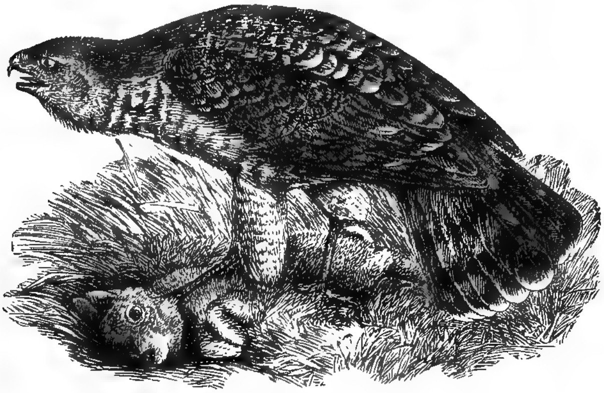


Fig. 1.—Duck Hawk (*Falco anatum*).

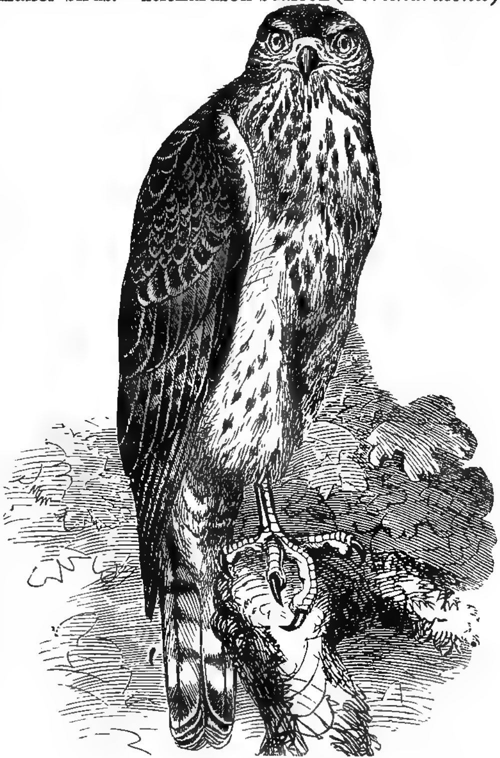


Fig. 2.—Goshawk (*Falco palumbarius*).

There are several North American species, of which the jerfalcon or gyrfalcon (*Falco gyrfalco*) is an arctic species, which descends to the United States in winter. It is of white color with dark markings, or ash colored with lighter bars, more than 2 feet long, and with wings 16 inches long. *F. candicans* is a pure white variety. There are several American varieties of the species, of which *F. labradorus* is marked by dark plumage The duck hawk, or great-footed hawk (*F. anatum*), probably identical with the European *F. peregrinus* or *communis*, the bird used in falconry, is from 18 to 20 inches long, and a very powerful, courageous, and destructive bird. It builds its nest on inaccessible cliffs, and preys on the smaller ducks and other water birds, pigeons and other land birds, and small animals It is generally distributed in the United States, but not abundant. The pigeon falcon or hawk (*F. columbarius*) is a common and generally distributed North American bird, about 13 inches long, of an ashy blue color above, and a pale fulvous shade below, with large, oblong dark spots. It is very destructive to the smaller birds. Richardson's falcon (*F. richardsonii*) is closely related to the last, though lighter colored. It is found from the Mississippi to the Rocky Mountains. The Lanier falcon (*F. mexicanus*) has its range in the Western United States, and southward. It is 18 inches long, of a plain brown hue above and white below, with brown patches and streaks. The sparrow hawk (*F. sparverius*) is an elegant little bird, very abundant throughout North America. It is about 11 inches long, of a cinnamon brown hue above, and whitish below, its plumage greatly varying in hue, and being peculiarly spotted and striped. It preys on mice and young birds. *F. femoralis* is a widely distributed Central and South American species, and reaches just north of the Mexican border. It is 15 inches long, of an ashy brown or pale slate color, according to age, the wings and tail with numerous white bars, the throat and breast white or tawny, with a broad black zone below. (C. M.)

FALK, Paul Ludwig Adalbert, a German jurist and statesman, was born Aug. 10, 1827, at Metschkau in Silesia. He was educated at the Gymnasium and University of Breslau, and in 1847 he began his legal career in the state service. In 1862 he was made counsellor of the court of appeals at Glogau, where he also labored on the *Ergänzungen und Erläuterungen der preussischen Rechtsbücher*, popularly known as the "Fünfmännerbuch." On the formation of the North German Confederation in 1867, he was elected as representative of Glogau in the constituent assembly, in which he acted at first with the "Old Liberal" party, but finally with the National Liberals. In 1868 he was assigned as privy counsellor to the ministry of justice, and was employed in the codification of the laws of the German empire. In February, 1871, he was made a representative of Prussia in the imperial council. When Prince Bismarck had resolved to make an aggressive movement on the privileges of the Roman Catholic Church, Dr. Falk was made minister of public worship and instruction, Jan. 22, 1872, and brought forward, in the Prussian parliament, a series of repressive laws, intended to give the government control of ecclesiastical affairs. After an exciting struggle these laws were passed by both houses and promulgated in May, 1873, but the attempt to enforce them was stoutly resisted by the Catholic clergy. The widespread agitation, or *Kultur-Kampf*, which ensued, made Dr. Falk's name familiar throughout Christendom. The resistance of the clerical party led to still severer laws. Several bishops were arrested and imprisoned, Archbishop Ledochowski was removed from his office, and hundreds of parishes were deprived of priestly ministration. In January, 1875, a law passed making civil marriage obligatory, and also providing that Roman Catholic clergy and members of religious orders might contract legal marriage. The pope, Feb. 5, 1875, issued an encyclical declaring the May laws invalid, and forbidding the faithful to observe them. The Prussian government retorted by withdrawing from the refractory clergy all state endowments and support. Dr. Falk's activity was by no means confined to attacks on the legal position of the Catholic Church. He effected a considerable increase of schools, raised the salaries of teachers, and improved the methods of instruction. When Leo XIII. succeeded to the papal throne, and entered into negotiations with Prince Bismarck for a restoration of harmony between church and state, Dr. Falk found his position untenable. In June, 1879, he asked permission to retire from office, and this was granted July 14. A peerage was offered to him, and he accepted it for his son, then an army officer. His public activity was now limited to the Reichstag. In 1882 he was appointed to the presidency of the court at Hamm.

FALLOUX, Alfred Pierre, Comte de, a French statesman, was born at Angers, May 7, 1811. He first became known by his lives of Louis XVI. (1840) and of Pope Pius V. (1844). As a legitimist he was elected to the chamber of deputies in 1846, but when the republic was declared in February, 1848, he recognized its authority. He was a member of the Constituent Assembly, and took an active part in its discussions. When Louis Napoleon was elected president, Comte de Falloux was made minister of public instruction, but being censured by the legislative assembly for arbitrary measures he resigned. He was afterwards elected to the Assembly, but he did not long support the policy of Napoleon. After the *coup d'état* of December, 1851, Falloux withdrew from Paris unmolested, and devoted himself to agriculture. In 1855 he became assistant editor of the *Correspondant*, the leading Catholic review. In 1856 he was admitted to the French Academy. In 1867 he took part in the Catholic Congress at Mechlin, and supported the declarations of the *Syllabus*. He was twice an unsuccessful legislative candidate of the clerical opposition, and in 1871 he declined a nomination on account of his health. In 1872 he took part in the abortive attempt to get the Comte de Chambord to recognize the tricolor as the national flag. Among his later works are *Madame Swetchine, sa vie et ses œuvres* (1859); *Dix ans d'agriculture* (1863); and *Questions monarchiques* (1873). He has also edited a collection of the letters of Madame Swetchine (1866).

FALLOWS, Samuel, an American bishop, was born at Pendleton, near Manchester, England, Dec. 13, 1835. He removed to Wisconsin in 1845, and graduated at the University of Wisconsin in 1859. Entering the ministry of the Methodist Episcopal Church, he became a chaplain in the army, but afterwards was made colonel and brevet brigadier-general. He became State superintendent of public instruction in Wisconsin in 1870, and president of Illinois Wesleyan University, at Bloomington, in 1874. In 1875 he entered the Reformed Episcopal Church, became rector of St. Paul's Church, Chicago, and edited *The Appeal*. In July, 1876, at the general council held at Ottawa, Canada, he was chosen a bishop, and has continued since to hold also his rectorship.

See Vol. IX. p. 16 Am. ed. (p. 16 Edin. ed.).

FALL RIVER, a city and port of entry of Massachusetts, in Bristol co., is on the eastern shore of Mount Hope Bay, an arm of Narragansett Bay. It is the fifth in population among the cities of Massachusetts; it is compactly built, lying on a succession of granite ridges that skirt the bay, and on both sides of the Quequechan River, that flows from Watupha Pond, a lake lying nearly 3 miles E. of the bay. The city's area is 27½ square miles, and, with its ponds, contains a little over 17,000 acres. The Watupha, though very short, formerly furnished a vast amount of water-power. It falls about 128 feet in the course of its last half mile, and as early as 1689 Captain Benjamin Church utilized the water-power by erecting a mill on the stream. In the early years of the 19th century iron-works were started for making nails and several grades of iron, and this enterprise was followed, in 1813, by the establishment of a small cotton-factory, which proved so successful that the city has pursued the development of that industry till now the corporations number 39, with 53 mills, including one woollen manufactory and the American Calico-printing Company. This last enterprise has struggled on through many reverses—having once been burned at the loss of $2,000,000—till now it ranks fifth in number of calico-printing machines among similar enterprises in the country, and second in capacity for producing calico fabrics. It runs 20 machines, and can turn out an aggregate of 75,000,000 yards per annum, and employs 1000 persons in the various grades of work. The iron-works run 105 nail-machines and several sets of rollers for other manufactures. The machines turn out 120,000 kegs of nails annually.

The chief product of the mills has been print-cloth for calico, though now a more varied assortment of goods is turned out, mainly wide goods, fancy dress-goods, sheetings, silesias, yarns, merino underwear, lawns, towellings, ginghams, drills, Jersey coatings, and chambrays. The number of mills is 53; capital, $17,538,000, really worth $35,000,000; spindles in use, 1,678,016; looms, 39,818; persons employed, 18,135;

weekly pay-roll, $113,000; yards of cloth manufactured annually, 467,250,000; bales of cotton used, 194,650; capacity of power, 28,120 horse-power; coal used, 139,100 tons. Some of the mills, as well as other buildings in the city, are handsome structures of granite.

The harbor of Fall River, formed by a widening of the mouth of the Taunton River, is spacious, covering seven square miles of water, is easy of access and sufficiently deep for the largest vessels. A large coastwise trade in coal, lumber, and cotton centres here, and as the Taunton River, which flows into the bay, has been deepened for some 14 miles, vessels of 1000 tons burthen easily ascend it to Somerset, Dighton, and Taunton. The coal traffic has grown to be a leading item of business here, about 500,000 tons being brought to the port annually. Lumber, grain, iron, and cotton form the chief articles of domestic commerce, and but little foreign trade is carried on from this port. In 1883 Fall River had 121 vessels enrolled and licensed, whose tonnage amounted to 44,817 tons; of these 22 were steamers, with a tonnage of 22,287 tons. The main line of the Old Colony and Newport Railroad passes through the city from Boston to Newport, R. I., and has its terminus here for steamers to New York. It is a very popular route between Boston and New York, especially for tourists during the summer season. There are railway connections also with Providence and New Bedford.

Fall River abounds in minor mechanical industries connected with her manufacturing enterprises. The local traffic is not extensive, and the rural districts are lacking in natural fertility, as granitic boulders cover most of the land. The chief feature of its surroundings is four beautiful ponds that lie within or near to the city. The largest—Watupha—covers 3500 acres, receives the water from two other ponds, and supplies the water for manufactories (all mainly driven by steam-power), and also for the use of the people. The mills are located close to the water-supply, are mostly built of granite, though some are of brick, and constitute a prominent feature of the view of the city from the bay, which is seldom surpassed for beauty in summer.

Fall River has about 52,000 inhabitants, having doubled since 1870, and increased eight-fold since 1840. Of these only one-third are of native origin. The Irish lead in numbers of the foreign-born, being 15,000; the Canadian French come next, 12,000; and the English and Scotch are numerous also.

Fall River has 27 churches, some of them very handsome structures. Of these 8 are Roman Catholic, 6 Methodist Episcopal, 3 Baptist, 3 Congregational, 2 Episcopalian, and the Christians, Unitarians, Friends, Presbyterians, and Primitive Methodists have one each.

The city is well provided with all the various grades of schools, in which 183 teachers are employed. A splendid high-school edifice, for classical, literary, and technical instruction, has been erected, the gift of Mrs. Mary B. Young. The city has also several beautiful cemeteries, a noble city hall, and other public edifices, a public farm of 110 acres for the poor, an orphan asylum, and many private edifices and blocks for business of great excellence. The most prominent public building is the United States custom-house and post-office. There are 2 daily and 4 weekly newspapers.

Fall River is part of an ancient purchase from the Indians in 1659, and down to 1803 was included in Freetown. The place was conspicuous in the war with the Indian King Philip in 1675–6. In 1803 it was set off as a separate town called Fall River. Its territory was enlarged in 1858, by having a strip of land set off from Rhode Island, when this part of the boundary line of that State and Massachusetts was finally settled. In 1804 its name was changed to Troy, and in 1834 it was changed back to Fall River. The Indian name of the place is said to have been Quequeteant, meaning "the place of quick-running water." (W. R.)

FANEUIL, Peter (1700–1743), an American merchant, was born at New Rochelle, N. Y., in 1700, of a Huguenot family. He settled at Boston, and was highly successful in his enterprises. The market at Boston was held in the open street until at a town-meeting, in 1740, Faneuil offered to erect at his own expense a suitable building, the second story to be used as a town-hall. The offer was accepted; the building was commenced in September, 1740, and completed in 1742. Faneuil died March 3, 1743. The original building being burned in 1761, it was rebuilt in 1763 at public expense. This second building, being much used by the patriots at the outbreak of the Revolution, obtained the name "The cradle of American liberty." While the British held Boston, in 1775, Faneuil Hall was used as a theatre. In 1805 the hall was much altered and enlarged.

"The Cradle of American Liberty"—1770.

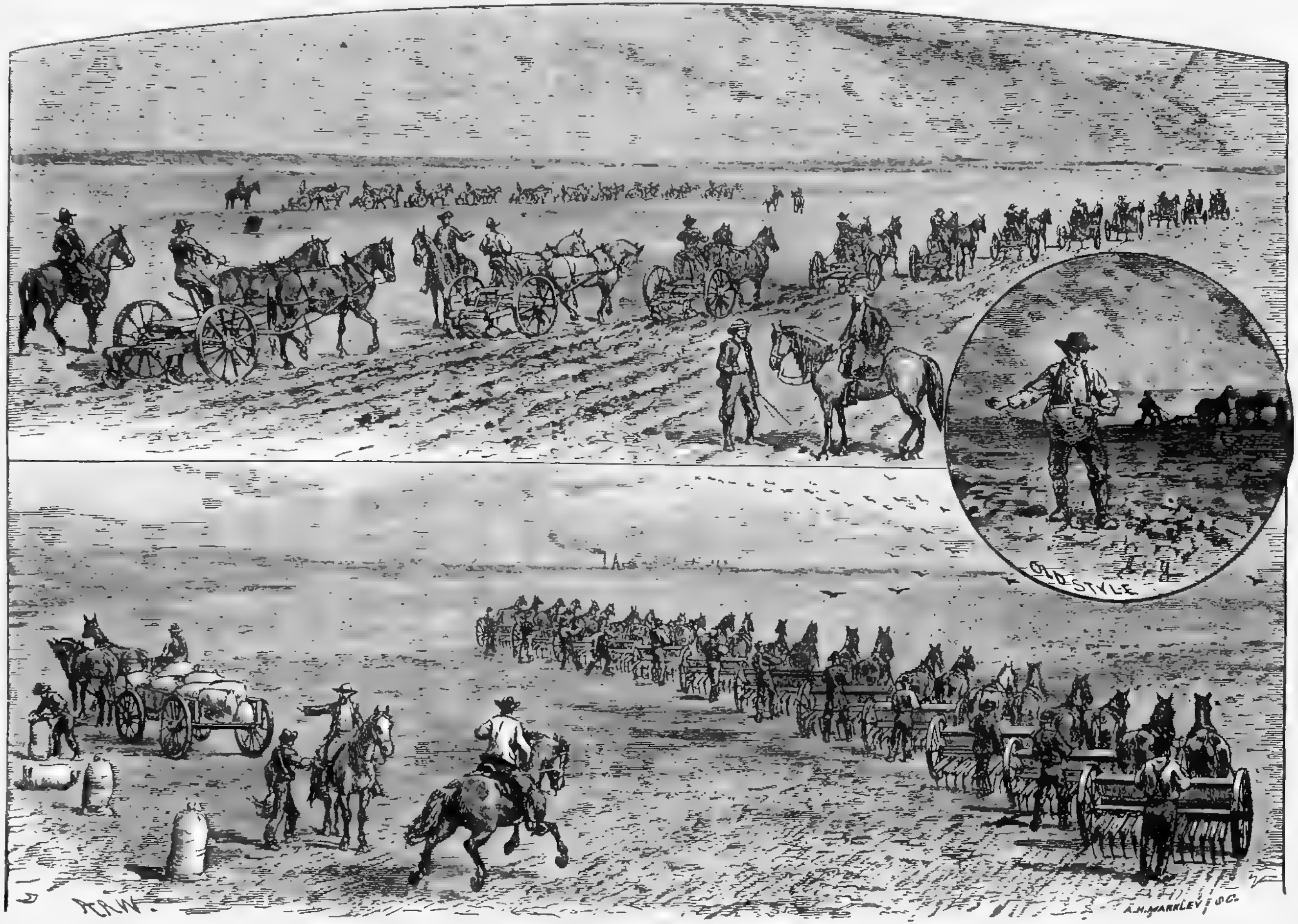
FARIBAULT, the county-seat of Rice co., Minn., is on the Cannon River, at the mouth of the Straight River, and on the Chicago, Milwaukee, and St. Paul Railroad, 53 miles S. of St. Paul. It contains the State school for the deaf and dumb, the blind, and the school for the feeble-minded, Seabury Divinity School (Protestant Episcopal), Shattuck School for boys, and St. Mary's Hall for girls. It has also a Roman Catholic school for girls, a parochial school, a graded public school. It has fine public buildings, 2 parks, a public library, 2 weekly newspapers and 3 monthly publications, an opera-house, 11 churches. It has a fire department, is lighted with gas, and has no public debt. In 1855 it was an Indian trading-post, and in 1872 was incorporated as a city. Population, 5415.

FARM. The word "Farm" as used in America is thus defined in the United States Census Report: "A farm is what is owned or leased by one man and cultivated under his care. A distant wood-lot or sheep-pasture is treated as a part of the farm; but whenever there is a resident overseer or manager, there a farm is reported. Farms include all considerable nurseries, orchards, and market gardens, which are owned by separate parties, which are cultivated for pecuniary profit, and employ as much as the labor of one able-bodied man during the year." According to that report as shown in the table annexed, only about one-seventh of the land-surface of the United States was improved, and this amount was divided into 4,008,907 farms, thus giving each an average of 71 acres. There were 4352 farms with less than 3 acres; 134,889 with from 3 to 10 acres; 254,749 with from 10 to 20 acres; 781,474 with from 20 to 50 acres; 1,032,910 with from 50 to 100 acres; 1,695,983 with from 100 to 500 acres; 75,972 with from 500 to 1000 acres; 28,578 with more than 1000 acres. The farms contained besides the improved lands 251,310,773 acres of unimproved land, thus making the entire farming area 536,081,835 acres.

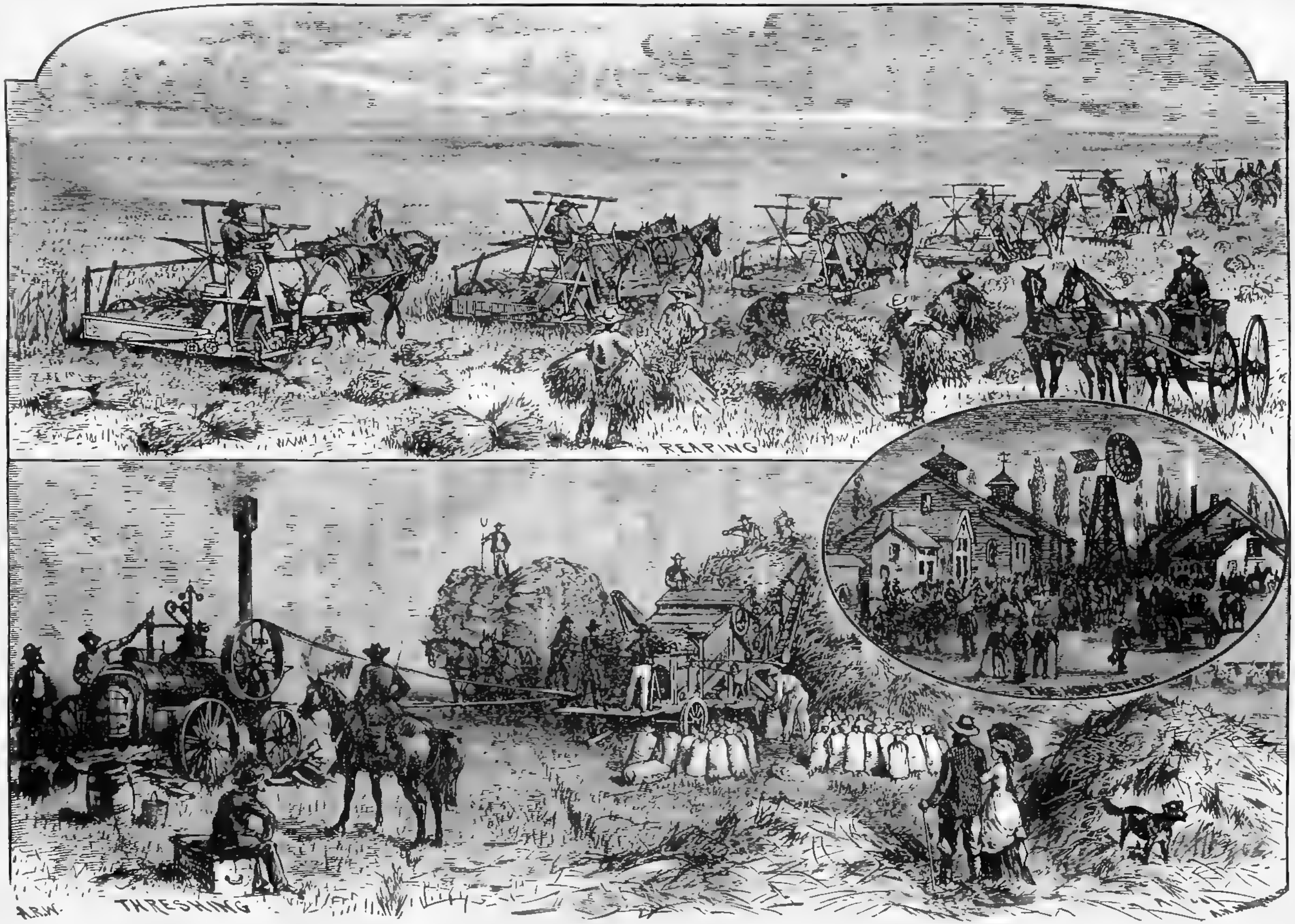
In 1870 there were 188,921,099 acres of improved land, valued at $7,410,243,089; the table shows an increase of 52 per cent. in area, and of 30.7 per cent. in value. Every State showed an increase, though in Virginia the percentage was only 0.42, and in Vermont 0.69, while Kansas showed an increase of 444 per cent., and Nebraska of 750 per cent. Even this percentage is exceeded by Wyoming Territory, which gives an increase of 24,492 per cent. The value of farming implements and machinery in 1870 was reported at $289,502,743, and in 1880 at $406,520,055, showing an increase of 52 per cent., being just the same ratio as that of the increase in area of improved land, but considerably greater than that of the increase in its value. This shows that the tendency is to use the improved implements of recent invention both on old and new farms.

The census of 1880 also gives the number of farmers, including stock-raisers, gardeners, etc., as 4,346,515, being 25 per cent. of the whole number of persons engaged in regular occupations. But if to the number

STATES.	Land Surface of the United States.	Number of Farms.	Improved Land.	Average Imp. Land in Farms.	Value of Farms.	Value of Implements.	Value of Products, 1879.
	Acres.		Acres.	Acres.	Dollars.	Dollars.	Dollars.
Alabama	32,985,600	135,864	6,375,706	47	78,954,648	3,788,978	56,872,994
Arkansas . . .	33,948,800	94,433	3,595,603	38	74,249,655	4,637,497	43,796,261
California . . .	99,827,200	35,934	10,669,698	296	262,051,282	8,447,744	59,721,425
Colorado	66,268,800	4,506	616,169	137	25,109,223	910,085	5,035,228
Connecticut . . .	3,100,800	30,598	1,642,188	53	121,063,910	3,162,628	18,010,075
Delaware . . .	1,254,400	8,794	746,958	85	36,789,672	1,504,576	6,320,345
District of Columbia	38,400	435	12,632	29	3,632,403	36,798	514,441
Florida	34,713,600	23,483	947,640	40	20,291,835	689,666	7,439,392
Georgia	37,747,200	138,626	8,204,720	59	111,910,540	5,317,416	67,028,929
Illinois	35,840,000	255,741	26,115,154	102	1,009,594,580	33,739,591	203,980,137
Indiana . . .	22,982,400	194,013	13,933,738	72	635,236,111	20,476,988	114,707,082
Iowa	35,504,000	185,351	19,866,541	107	567,430,227	29,371,884	136,103,473
Kansas . . .	52,288,000	138,561	10,739,566	77	235,178,936	15,652,848	52,240,301
Kentucky . . .	25,600,000	166,453	10,731,683	65	299,298,631	9,734,634	63,850,155
Louisiana . . .	29,068,800	48,292	2,739,972	57	58,989,117	5,435,525	42,883,522
Maine	19,132,800	64,309	3,484,908	54	102,357,615	4,948,048	21,945,489
Maryland . . .	6,310,400	40,517	3,342,700	82	165,503,341	5,788,197	28,839,281
Massachusetts . .	5,145,600	38,406	2,128,311	55	146,197,415	5,134,537	24,160,881
Michigan . . .	36,755,200	154,008	8,296,862	54	499,103,181	19,419,360	91,159,858
Minnesota . . .	50,681,200	92,386	7,246,693	78	193,724,260	13,089,783	49,468,951
Mississippi . . .	29,657,600	101,772	5,216,937	51	92,844,915	4,885,636	63,701,844
Missouri	43,990,400	215,575	16,745,031	78	375,633,307	18,103,074	95,912,660
Nebraska . . .	46,758,400	63,387	5,504,702	87	105,932,541	7,820,917	31,708,914
Nevada	70,233,600	1,404	344,423	246	5,408,325	378,788	2,855,449
New Hampshire .	5,763,200	32,181	2,308,112	72	75,834,389	3,069,240	13,474,330
New Jersey . . .	4,771,200	34,307	2,096,297	61	190,895,833	6,921,085	29,650,756
New York . . .	30,476,800	241,058	17,717,862	73	1,056,176,741	42,592,741	178,025,695
North Carolina .	30,991,200	157,609	6,481,191	41	135,793,602	6,078,476	51,729,611
Ohio	26,086,400	247,189	18,081,091	73	1,127,497,353	30,521,180	156,777,152
Oregon	60,518,400	16,217	2,198,645	136	56,908,575	2,956,173	13,234,548
Pennsylvania . .	28,780,400	213,542	13,423,007	63	975,689,410	35,473,037	129,760,476
Rhode Island . .	694,400	6,216	298,486	48	25,882,079	902,825	3,670,135
South Carolina .	19,308,800	93,864	4,132,050	44	68,677,482	3,202,710	41,969,749
Tennessee . . .	26,720,000	165,650	8,496,556	51	206,749,837	9,054,863	62,076,311
Texas	166,865,600	174,184	12,650,314	72	170,468,886	9,051,491	65,204,329
Vermont	5,846,400	35,522	3,286,461	93	109,346,010	4,879,285	22,082,656
Virginia	25,681,000	118,517	8,510,113	72	216,028,107	5,495,114	45,726,221
West Virginia . .	15,772,800	62,674	3,792,327	60	133,147,175	2,669,163	19,360,049
Wisconsin . . .	34,848,000	134,322	9,162,528	68	357,709,507	15,647,196	72,779,496
Arizona . . .	7,226,800	767	56,071	73	1,127,946	88,811	614,327
Dakota . . .	93,528,000	17,435	1,150,413	66	22,401,084	2,390,091	5,648,814
Idaho	53,945,600	1,885	197,407	106	2,832,890	363,390	1,515,314
Montana	92,978,400	1,519	262,611	175	3,234,504	401,185	2,024,923
New Mexico . .	78,374,000	5,053	237,392	47	5,514,399	255,162	1,897,974
Utah	52,601,600	9,452	416,105	44	14,015,178	946,753	3,337,410
Washington Territ'y	42,803,200	6,529	484,346	74	13,844,224	958,513	4,212,750
Wyoming Territory	62,448,000	457	83,122	184	835,895	95,482	372,391
Totals . . .	1,900,800,000	4,008,907	284,771,042		10,197,096,776	406,520,055	2,213,402,564


OLD STYLE
R.R.W.
A.H. MARKLEY, SC.

OLD STYLE SOWING.—"BONANZA" FARM STYLE OF PLOWING AND SOWING.



HOMESTEAD OF A "BONANZA" FARM.—REAPING AND THRESHING.

of farmers we add 3,323,876 agricultural laborers, we shall find 44 per cent. of all having regular occupations to be engaged in tilling the soil. Indeed we might safely give a higher estimate, for it is noted that in some agricultural districts "agricultural laborers" were reported simply as "laborers," and hence were not included in the above calculation. As regards the wealth of the farming class, the census report shows that while the assessed value of all the real estate in the country was $13,036,766,925, that of farms was $10,197,096,700, being 77 per cent. of the whole. The total personal property was assessed at $3,866,226,618; that of farmers, including live-stock, was $1,906,984,655, being 49.3 per cent. of the whole. Combining real and personal property, we find that out of a total assessed value of $16,902,993,543, farmers held $12,104,081,431, or 71 per cent., though they form only 25 per cent. of the population engaged in gainful occupations. It may be that their wealth, being in a more palpable form than some other kinds, is more fully assessed, yet it is not probable that the actual value varies very much from this estimate. It may safely be stated at two-thirds. Farming is proved then to be not only a necessary and honorable occupation, but lucrative, as compared with other occupations. It has been favored by legislation in the various States, especially by the homestead exemption laws. These laws give stability to the population, and encourage the farmer in his efforts to improve his land.

The average size of farms in the United States is 71 acres, and except in some of the Territories, where fertile unimproved land is still abundant, the tendency is to even smaller farms, from 40 to 50 acres. The quarter-section (160 acres) of land which is allowed by law to the actual settler is found to be more than one man can properly attend to, and it is readily divided into two or more farms, as the settler's sons grow up. The skilful management of moderate sized farms is found to bring better and quicker returns than the enlarging of their area, which was once the criterion of a successful farmer. Now the desire of the intelligent farmer is not so much to get more acres as to get more from each acre. (See AGRICULTURE, Vol. I.)

The famous exception to this rule is found in the prairies of the west and north-west, which are rapidly coming under cultivation. In Kansas, Nebraska, Minnesota, and more recently Dakota, the capitalist, availing himself of the latest inventions of American ingenuity in farming implements, draws from the apparently unlimited fertility of the virgin soil abundant harvests of wheat and maize, with which the transcontinental railway systems enable him to supply the markets of the world. The immense scale on which agricultural operations are there conducted is strikingly shown in the illustrations (Plates XIX. and XX.) taken from Dr. L. P. Brockett's work, *Our Western Empire* (Phila., 1881). Yet even in that region of "bonanza farms" the immigrant of small means finds room and opportunity to better his condition by diligence and thoughtful attention to the requirements of the soil in order to produce a satisfactory return of his outlay.

FARNHAM, ELIZA WOODSON (1815–1864), an American author and philanthropist, was born at Rensselaerville, N. Y., 1815, her maiden name being Burhaus. In 1835 she removed to Illinois, where she married Thomas Jefferson Farnham. In 1841 she returned to New York and devoted herself to philanthropic labors. From 1844 to 1848 she was matron in the State Prison at Sing Sing, and meantime published *Life in Prairie Land*. She spent some years in California, and organized a society to assist women in emigrating to the West. She published *California In-doors and Out* (1856), *My Early Days* (1859), and *Woman and her Era* (2 vols., 1864). She died at New York, Dec. 15, 1864. A posthumous work, *The Ideal Attained*, appeared in 1865.

Her husband, **THOMAS JEFFERSON FARNHAM** (1804–1848), was born in Vermont, studied law, and in 1839 organized an expedition across the continent to Oregon. He also visited California, and procured from the Mexican Government the release of several American and English prisoners. He published *Travels in Oregon Territory* (1842), *Travels in California and Scenes on the Pacific* (1845), *Mexico: Its Geography, People, and Institutions* (1846). He died in California, in September, 1848.

FARR, WILLIAM (1807–1883), an English medical statistician, was born at Kenley, Shropshire, Nov. 30, 1807. He studied medicine at the Universities of Paris and London, and graduated from University College in 1833. While practising in London he began to lecture on public health, and contributed frequently to the *British Annals of Medicine*. To McCulloch's *Statistical Account of the British Empire* (1837), he contributed a noted chapter on "Vital Statistics," which led to immense improvement in the collection of data for that department. The registration of all the deaths in England and their causes was then commenced, and Dr. Farr was appointed to a position in the Register's office. He continued to devote himself to the study of statistics, of epidemics, and of the duration of human life, and has written many official reports on these subjects. He was assistant commissioner in taking the censuses of Great Britain from 1851 to 1881. His researches have given greater precision to the science and practice of life insurance. His paper "On the Construction of Life Tables" (1859), his introduction to the *English Life Tables* (1864), and his *Statistical Nosology*, are of great value. In 1855 he was elected Fellow of the Royal Society, and in 1859 he received from the University of Oxford the degree of D. C. L. He died April 14, 1883.

FARRAR, FREDERIC WILLIAM, an English clergyman, was born at Bombay, India, Aug. 7, 1831. He was educated at King William's College, near Castletown, Isle of Man, and at King's College, London, where he first came under the influence of Prof. Frederic D. Maurice. He entered Trinity College, Cambridge, and graduated in 1854 with high honors. In 1856 he was made a fellow of Trinity College; in 1857 he received the degree of M. A., and was ordained priest. He had already entered on the educational work to which he devoted more than twenty years of his life. After a few months service as assistant master in Marlborough College, he spent fifteen years (1855–71) in the Harrow School, and then was recalled to be head master of the former. As a teacher, he not only had remarkable power of inciting intellectual exertion and of inculcating correct literary taste, but by both example and precept he trained his pupils to a high sense of duty. His sermons delivered in the school chapel are models for such purpose. His merits as a preacher were recognized in his appointment as a chaplain to the queen in 1873. He has also repeatedly been one of the University preachers, both at Cambridge and at Oxford. In 1874 he received the degree of D. D. from Cambridge University. In 1876 he was appointed canon of Westminster and rector of St. Margaret's Church. In 1883 he was made archdeacon of Westminster. He has taken an active part in various movements for the improvement of the lower classes, and has especially been an advocate of the total prohibition of the liquor traffic.

Archdeacon Farrar has been prominent in several departments of literary activity. He began with some works of fiction in which he depicted in vivid colors school and college life from his own experience. The first of these was *Eric, or Little by Little* (1858); then came *Julian Home: a Tale of College Life* (1859); and *St. Winifred's, or the World of School* (1863), the last being issued anonymously. These all have retained their popularity with the class for whom they were intended.

While actively engaged in school work, Mr. Farrar prepared some text-books in Greek grammar and some philological treatises, displaying learning and thought.

The first of these was on *The Origin of Language* (1860), in which he maintained with considerable force of argument the interjectional theory. It was followed by *Chapters on Language* (1864), and afterwards by a treatise on *Families of Speech* (1870), which had already been delivered as lectures before the Royal Institution. He also contributed to the general discussion of the subject of education and especially of the proper place of the classics in modern liberal training.

The greater number of Archdeacon Farrar's works, however, have been produced in the line of his activity as a Christian preacher and theologian. At first simply collections of sermons, they have in later years become transcripts of his studies in the historical development of Christianity. His first volume of sermons appeared in 1865; in 1870 came his Hulsean lectures, *The Witness of History to Christ;* in 1873 *The Silence and the Voices of God;* in 1878 *Eternal Hope.* This last work, which set forth in part his view of the teachings of Scripture in regard to the future state, provoked an animated discussion. His works of a historical and biographical character include *Seekers after God* (1869); *The Life of Christ* (1874); *The Life and Work of St. Paul* (1879); *Saintly Workers* (1876); *The Early Days of Christianity* (1881).

Farrar's learning is ample; his thoughts are clear and well arranged; his style is brilliant and rhetorical. In theology he belongs to the Broad Church School. He shows thorough appreciation of the difficulties which the religion of Christ encounters from the materialistic philosophy, scientific dogmatism, and unsparing criticism of the present day, but equally plain are his unwavering faith in its ultimate triumph and his constant endeavor to remove the accretions and obstacles which impede its progress. In the history of the world he sees continual manifestation of the grace of God, and he tries to awaken others to the same view, the same hope, and the same earnestness in Christian work.

FARRER, HENRY, an American artist, was born in London, England, March 23, 1843. His parents removed to New York during his youth. He has given much attention to etching and water colors. In 1879 he was made secretary of the American Water Color Society, and in 1881 president of the New York Etching Club. Among his works may be mentioned A Calm Afternoon; The Silent Tongue (1872), which is a study of a deserted ferry wharf; The Old Homestead at Twilight (1875); A Windy Day (1876), exhibited at the Centennial Exhibition, Philadelphia; A Quiet Pool (1878), exhibited at the Paris Exposition of that year; Autumn (1883), exhibited in London. His pictures are careful, quiet studies of scenes which win regard the more closely they are examined.

FATALISM is a theory which affirms that all things are subject to an inflexible necessity lying outside of the human will. There is a popular form of fatalism existing as a fruit of ignorance and superstition by which determining phases of human life are ascribed to luck or chance. This irregular and irresponsible development of thought is hardly susceptible of further definition or classification. Fatalism ascribes the origin of its necessity to the will of a free deity, or to nature. In the latter case, that namely of circumstantial fatalism, the controlling necessity may be regarded as involving Deity itself in its compulsions. Fatalism originates sometimes as a religious dogma and as an actual or supposed part of a Divine revelation: this is termed religious fatalism. In the other case it arises as a product of certain phases of metaphysical inquiry, and is termed speculative or philosophical fatalism.

The Fates or Parcæ of the Greeks who, according to the prevailing mythology, supervised the affairs of the earth and punished its malefactors, bear only a remote and indefinite relation to the general doctrines of fatalism. Their work was a surprise and their purpose was generally effective: they thwarted human design and interfered with the sequence of cause and effect, and yet their operations were regarded rather as interferences than as laws. They effected an intrusion upon the ordinary and even course of nature, rather than an expression of a universal control. Many of the early Greek writers were evidently fatalists. Sophocles devotes one of his plays largely to the exposition of this conception of life. Even Plutarch in his *Morals* suffers his philosophy to be so largely influenced by his mythology, that Fate and Providence and Free Will become inextricably tangled. Among the Stoics, also, there existed a school whose followers regarded man as the creature of an absolute fate. By some careless writers fatalism is regarded as a prevalent doctrine among the Stoics. It is evident, however, from a careful reading of Epictetus, that this was far from being a universal doctrine among them, this writer going to the extent of affirming that even Jupiter himself cannot compel a man to act contrary to his personal choice.

The most prominent and unequivocal avowal of fatalism in religion is found in connection with Mohammedanism. According to the conception of this religion, every man's life is in all its details predetermined. His entire experience is a "destiny" which he works out in a way that is more or less mechanical. God or Allah is an absolute despot. He is limited by no necessities of his own nature. Whatever he does is right. He may give one law to the Moslem and another to the Christian. He even varies and changes his laws for the same people, and he fixes, arbitrarily, for every man, the course and the end of his life. Singularly enough, this fatalistic idea of Divine government is not regarded as impairing personal responsibility. The sovereignty of Allah is absolute and unlimited. He marks the manner and measure of life: in reference to thought and motive and every detail of its environment it is fixed and unalterable. To the inspiration of this conception of destiny is largely due the fanatical and matchless fearlessness of the Moslem soldiers. No terrors were too great for men who could not escape destiny, who would be wise only in fulfilling it, and who were fighting for Him that controlled fate itself. Sometimes, on the other hand, this same fatalism has paralyzed effort when men, anticipating doom, have refused to move hand or foot to avert or mitigate its power. The peril of calamity was apt to be regarded as its prophecy, and a doom which was simply threatened was regarded as an indication that it was fixed. "It is Allah," was an expression that usually indicated the end of effort and of hope. It is interesting to observe that among the early phases of sectarianism among the Moslems was the growth of a school which emphasized the apparent contradictions of the Koran in its teaching of absolute predestination on the one hand, and of free will on the other, the result of which has been the growth of a large body of believers who, placing the emphasis of their faith on the latter element of the creed, reject the grosser forms of fatalism (see MOHAMMEDANISM in the ENCYCLOPÆDIA BRITANNICA).

Fatalism is often charged upon certain phases of Christianity. John Calvin formulated a system of doctrine which lays prominent stress upon the ideas of the divine foreknowledge and foreordination. Starting with the idea of an absolute purpose on the part of God, all things are regarded as being involved in its conclusions, and even the minute events of personal life are by it fixed and determined. This form of statement is regarded as involving the same idea of a predominant necessity as the avowed fatalism of the East, differing prominently however in the substitution of a personal God for an impersonal and undefined destiny. We are not concerned in this article with anything more, however, than with the classification of these different schools of religious and scientific thought, which in scientific rather than popular phraseology are assigned to limits now under discussion. Jonathan Edwards is the foremost writer among all who have attempted to follow Calvin's position to legitimate metaphysical conclusions. He denied the freedom of the will and wrote an elaborate treatise in defence of his attitude. All spiritual advance on the part of man was made contingent upon an extraneous influence, which is imposed according to an eternally foreordained plan on the part of God. These facts were not regarded by him as impairing personal responsibility. So far as this is affirmed by those who follow him it is regarded as a perversion rather than a fair result of his theology. In certain parts of the United States and also in England there has arisen a class of religionists who are charged with pushing to undue limits the leading tenets of the Calvinistic theology, while they have utterly excluded everything that tends to modify their rigor. They are known as Antinomians. They affiliate in other dogmas with various sects. Such of them as associate with the Baptists are denominated "Old School," or in derision "Hardshell" Baptists. Consistently with their theories of the absoluteness and rigor of the sovereignty of God they refuse to acknowledge the need of intermediate agencies for influencing human will. This is directly moved and controlled by Divine power alone. Missionary societies and Sunday-schools, no less than direct appeals to men intended to secure their conversion, are regarded as useless attempts to invade a divine prerogative. In this entire realm man is regarded as being utterly helpless and simply at the disposal of a Sovereign and Divine power, which arbitrarily fixes the destiny of man apart altogether from any determining processes of his own will.

Necessitarianism or philosophical fatalism is found to be a logical result of two contrasted phases of metaphysical inquiry. Under certain modified forms it has been held and defended by foremost writers of their several schools in Europe and America. The term fatalism as applied to philosophy has reference rather to the predominating influence by which human action is decided than to the manner in which that decision may be pronounced. Outside of man's self we may conceive of two great powers as having either of them independent existence. They are God and nature. If self is entirely controlled and neutralized by deity, the result is religious fatalism. If on the other hand nature is the controlling power, the result is circumstantial fatalism. The philosopher does not necessarily exclude a personal deity from this latter view, but regards the whole realm of being as involved in the control of a fixed necessity. The existence of this necessity is affirmed by its relation to the human will. Fatalism, therefore, whether considered in its use with reference to philosophy or theology in this article, is not regarded as implying a personal power on the one hand or a blind chance or destiny on the other, but is the simple affirmation of a supposed law of sequences in which personal decision is overruled by a power lying outside of the province of the human will.

The sensational philosophy on the one hand when pushed to extreme logical conclusions seems to involve fatalism as a necessary consequence. Hobbes was one of the first English philosophers to accept this result. Following the method of induction which Bacon had introduced, he carried the theories of his master into metaphysical realms. He began by making sensation the real origin and medium of all ideas and consequently of all knowledge. Since sensation can come only by that which was material, nothing but what was material had real existence. Every thought even is the product of single or remembered sensations. Consequently good and evil are only words expressing the fact that sensations are agreeable or otherwise, and since our sensations are contingent upon our environments, and since their effects as to agreeableness or disagreeableness is not the result of our volition, and as this is itself perpetually determined from without, it follows that man is perpetually the helpless creature of something which the philosopher calls necessity. It is difficult to see where even a shadow of personal responsibility remains under such a theory. David Hartley, another prominent English philosopher, proclaimed with yet greater emphasis the same idea. As all our thoughts are the fruit of sensations, and excited directly by these or aroused indirectly by the laws of association of ideas, it follows that the power of the will is a nonentity, that man has no control over his own mind, and is the creature of an irresistible power outside himself. Hartley was a man of devout spirit and of a deeply religious life, and resisted strenuously the practical inferences which others derived from the logic of his philosophy. The sensational philosophy holds in short that desire and will are synonymous, that these are excited by sensations which are determined in their effects by our education, which in turn is the inevitable result of our experience. Since our will is thus mechanically excited, it is impossible that any man should act otherwise than he does under any given circumstances. It tends to establish along a line of natural law a theory of circumstantial fatalism.

Robert Owen, of Wales, who wrote a socialistic treatise entitled the *New Moral World* (1812), gave open expression to his belief in the ultimate conclusions of sensationalism as involving inevitable necessity. He regards man as a compound being whose character is formed "of his constitution or organization at birth and of the effects of external circumstances upon him from birth to death, such original organization and external influences continually acting and reacting each upon the other." He receives his feelings and convictions without the exercise of volition: indeed these feelings and convictions are regarded as creating the motive to action which Owen denominates the will. In short, the character of man is made for him and not by him. The final effect of Owen's necessitarian doctrine has been regarded to be subversive of morals and religion.

The ideal philosophy on the other hand pursues in an opposite direction an investigation into the causes and nature of things which sometimes involves a similar result. Baruch Spinoza, of Holland, is the author of a system of objective idealism. His teaching began with an identification of the idea of substance with God. God is the free cause (*causa libera*) and the only thing that is free. He is also the immanent cause of all things. He does not stand apart from the universe and create. He simply *is*, and all things that are are simply the unfolding of himself. Man seems to be free only in a certain limited sense, and is involved in the absolute determinations which include the universe and the very nature and essence of the Deity itself. All individual beings, whether nations or men, are changing forms of substance, parts of God, as the wave is a part of the sea and the idea of the mind. The individual is absorbed in an infinite substance whose evolutions are determined and inevitable.

Among subjective ideal philosophers it would naturally be difficult to find any who avow a necessitarian or fatalistic theory—the tendency of this line of thought being naturally to exalt the liberty of the individual will. Hegel has been charged with necessitating by his absolute idealism a conclusion of fatalism, but this has arisen from his near approach to Spinoza in some of his conclusions, and the impression has arisen from a failure to observe the accurate line of demarcation between the two philosophies.

J. Stuart Mill has been classed among necessitarian writers, but he himself denies the term while seeming to avow the theory which is usually described by its use. In his *Examination of Sir William Hamilton's Philosophy*, while contending against the doctrine of free will and declaring that a volition follows as inevitably from corresponding moral causes as a physical result from a physical cause, he avows this as a conclusion resulting from experience. He refuses to commit himself to the declaration that the nature of things demands such a sequence. He does not know, he says, that it *must* thus result. He seems to desire himself to be regarded as an agnostic with reference to the idea of necessity. His distinctions are subtle and to many unsatisfactory. He declares that real fatalism is of two kinds: "Pure or Asiatic fatalism—the fatalism of the Œdipus—holds that our actions do not depend upon our desires. Whatever our wishes may be, a superior power or an abstract destiny will overrule them and compel us to act not as we desire but in the manner predestined." "Modified fatalism holds that our actions are determined by our will, our will by our desires—these by the joint influence of the motives presented to us and of our individual character." He adds in substance, that we are not responsible for our actions or our character and should in vain attempt to alter either or both. Mill departs from this theory afterward so far as to attempt to establish responsibility while affirming that the motives which influence the will are necessarily determining and inevitable in their result.

The literature of this subject is very extensive, and embraces not only a wide range of Asiatic writings but almost all the recent works on philosophic subjects published in England and America. The following are among the most important: Caussin de Perceval, *Essai sur l'histoire des Arabes avant l'Islamisme pendant l'epoque de Mahomet, et jusqu' à la reduction de toutes les tribus sous la loi musulmane* (Paris, 1848); J. J. Döllinger, *Muhammed's Religion nach ihrer innern Entwickelung und ihrem Einflusse auf das Leben der Völker* (Ratisbon, 1838); *Islam, its History, Character, and Relation to Christianity* (Boston, 1874); *Plutarch's Morals* (vol. v., pp. 293–308); Ralph Waldo Emerson, *Conduct of Life*, pp. 1–43 (Boston, 1860); A. Bain, *Mental and Moral Science*, pp. 369–428 (1868); C. Bray, *Philosophy of Necessity* (1841), a work of considerable interest; Jonathan Edwards, *A Careful and Strict Inquiry into the Prevailing Notions of the Freedom of Will*, in *Works*, pp. 3–93 (London, 1840); "Causality, Liberty, and Necessity," in the *Lectures of Sir Wm. Hamilton* (Vol. 2, ch. 39–41); R. G. Hazard, *Freedom of Mind in Willing;* Thomas Hobbes, *Tripos Point of Liberty, Necessity, and Chance*, in *Works* (Eng., 1840), vols. 4 and 5; J. Stuart Mill, *Examination of Sir Wm. Hamilton's Philosophy*, vol. 2, pp. 265–304 (1865); J. Priestley, *Letters on Necessity*, in *Works*, vol. 4; Emanuel Kant, *Critique of Pure Reason;* Aristotle, *Nat. Ausc.*, II., ix. 1.; Robert Owen, *Book of the New Moral World* (1812). (T. A. K. G.)

FAUGÉRE, Armand Prosper, a French literary historian, was born at Bergerac, Dordogne, Feb. 10, 1810. In 1836 he founded the *Moniteur religieux.* In researches for his *Eloge de Blaise Pascal* (1842) he discovered several important documents, from which he was able to restore in their original form the *Pensées, Fragments et Lettres de Blaise Pascal* (1844). He also edited memoirs of Pascal's relatives, and in 1868 defended him against the attacks of M. Chasles. He was employed in the department of public instruction, and afterwards became director of the archives in the bureau of foreign affairs. Besides his works relating to Pascal he published *Mémoires de Madame Roland* (1864), *Fragments de littérature morale et politique* (1865), and some pamphlets on national economy.

FAUNA. The word "fauna" is now very generally used to express the entire assemblage of animals that inhabit any given locality. Thus we can speak of the fauna of Pennsylvania, of the United States, of North America, or of the Western Hemisphere. Every group of animals has its centre or head-quarters, where the species belonging to it are more abundant than they are elsewhere. In the same manner every species has its centre of distribution, and becomes less common as we recede from that centre. Thus every large tract of land bounded by mountain or oceanic barriers has some orders, families, or genera of animals peculiar to itself; and smaller areas, defined by less impassable barriers, such as rivers, deserts, or narrow seas, yet usually have their peculiar species, and are often the home of larger groups which do not occur elsewhere. These peculiar species, genera, or larger groups mark the distinctness of the fauna of any region. If political boundaries approximately followed natural ones, each country would have its peculiar fauna, but as the lines man has traced upon the globe are in great part artificial, a fauna which has distinctive characters may be divided up between several countries; while another country may include within its boundaries several more or less distinctive assemblages of animals. Thus, though we may speak of the fauna of Pennsylvania or of New York, the difference between these assemblages of animals is very small, and the same would be found to be the case with Nevada and Utah. The most distinct fauna of the United States is that of the Pacific coast; separated from the rest of the country by the Sierra Nevada and Rocky Mountains. The great basin and great plains have also their peculiar forms; the Gulf States, especially Florida, savor of the tropics; and the Mississippi basin has numerous fishes and shellfish which are either peculiar to it or have their centre of distribution there. The most peculiar fauna to be found upon the earth's surface is that of Australia, characterized by the egg-laying quadrupeds, the echidna and the ornithorhynchus; by an assemblage of pouched mammals or marsupials; by an abundance of pigeons and parrots; by the megapodes or mound-building birds and the bower birds; by strange forms of reptiles; and by the curious fish ceratodus. The next most peculiar fauna is that of South America, the land of armadillos, sloths, anteaters, and varied forms of gnawing mammals, and rich in birds, reptiles, fish, and insects not to be found elsewhere. The third in the list of peculiar faunas is that of South Africa and Madagascar. Here dwell the aardvark and the scaly anteaters, some singular carnivora, and the greater part of the monkey-like lemurs. Madagascar is the head-quarters of the lemurs, and the few forms not found there or in the adjacent continent are to be met with in the East Indian islands, which partake also of the peculiar creatures of Australia. It is an interesting fact that these three most peculiar faunas of the globe are all centred in the southern land masses. It is not unlikely that they are the remnants of the fauna of an antarctic continent which is now for the most part submerged. The animals of the rest of the world show fewer peculiarities. The great mammals of India and Central Africa, the elephant, the rhinoceros, the hippopotamus, the lion, etc., were in ages geologically not remote represented by kindred forms in the north temperate zone. They seem to be principally the descendants of a homogeneous fauna which once spread to the polar regions, and not improbably had its starting point there in an age when a more uniform climate prevailed. Subsequent evolution upon separated continents, coupled with climatic and other changes, have caused great variations; some southern forms, as the opossums, have spread northwards; and in North America most of the great ruminants perished before the present age set in, leaving their bones alone to tell of their existence; yet there is still sufficient resemblance to point to a common origin. The ocean has also its faunal regions, but differently distributed from those of the land. There are in the ocean three principal faunas: (1) that of the coast and shallow seas, (2) that of the ocean surface, (3) that of the deep seas. The first, or littoral fauna, may be divided into several sub-faunas, and to some extent reflects the conditions to be found on land; the second, or pelagic fauna, is richest within the tropics, but its forms are often widely spread; while the third, or abyssal fauna, is nearly cosmopolitan, as the conditions of existence at great depths do not differ greatly the world over.

(W. N. L.)

FAVRE, Jules Claude Gabriel (1809–1880), a French statesman, born in Lyons, March 21, 1809. He studied law in Paris, and took part in the revolution of 1830; became an advocate in Lyons, and both there, in 1834, and at Paris, in 1835, won fame for his successful defence of certain revolutionists and socialists. In 1836 he removed to Paris. He was for a time secretary-general of the interior in the republican ministry of 1848, and took an active part in the constituent assembly. Under the second empire he was a bold and outspoken opponent of the imperial policy on most of the great questions of the time, and in the *corps législatif* he was regarded as the chief of the democratic opposition. With Thiers, in 1870, he opposed the hostile preparations directed against Prussia; but when once the war was begun, he cordially supported the cause of the nation. After Sedan he became vice-president and minister of foreign affairs in the new republic. In the negotiations which preceded the definitive treaty of peace with Germany Favre did his best to prevent the cession of Alsace-Lorraine. Though personally the friend of Thiers, he left the ministry in July, 1871. In 1876 he was returned as senator for the department of Rhône. He died at Versailles, Jan. 20, 1880. Favre's reputation as a brilliant and finished orator was deservedly high, and the literary excellences of his style won him a place in the Academy in 1867. Many of his speeches and political writings have been printed in book-form.

FAWCETT, HENRY (1833–1884), an English publicist and statesman, was born at Salisbury in 1833; graduated at Trinity Hall, Cambridge, in 1856, with high mathematical honors, and in that year became a fellow of his hall. In 1858 an accident, which occurred while he was shooting, deprived him of sight. Yet with rare courage he persevered in the plan of life which he had already marked out for himself. In 1863 he was chosen professor of political economy in the University of Cambridge. After three defeats for parliament, he was returned, in 1865, as member for Brighton, which borough he represented till 1874, when he was elected for Hackney. In 1880 he was made postmaster-general, and greatly improved the postal service. In Parliament he was a frequent speaker, particularly on Indian finances; in politics he was an advanced liberal, favoring election by ballot and woman suffrage. Among his works are *A Manual of Political Economy* (1863; revised and enlarged ed., 1867); *The Economic Position of the British Laborer* (1865); *Pauperism* (1871); a volume of *Speeches* (1873); *Free Trade and Protection* (1878), and many magazine articles. He died Nov. 5, 1884. His wife (born in 1847) was his efficient helper in his remarkable career. She is author of *Political Economy for Beginners* (1870), and *Tales in Political Economy* (1874). See Leslie Stephen's *Life of Henry Fawcett* (1885).

FAY, THEODORE SEDGWICK, an American author, was born in New York city, Feb. 10, 1807. He was admitted to the bar in 1828, but devoted himself to literature. His contributions to the *New York Mirror*, of which he was for a time editor, were collected under the title *Dreams and Reveries of a Quiet Man.* In 1833 he went to Europe, and in 1837 he became secretary to the American Legation at Berlin. In 1853 he was appointed minister resident at Berne, Switzerland, which position he held till 1861. He published *The Minute Book* (1834), a journal of his travels; several romances, including *Norman Leslie* (1835; new ed., 1869); a long poem called *Ulric, or The Voices* (1851); and a *History of Switzerland* (1860). He also published a series of papers on Shakespeare.

FAYE, HERVÉ AUGUSTE ETIENNE ALBANS, a French astronomer, was born at Saint Benoît du Sault, Indre, Oct. 5, 1814. He studied mathematics at the École Polytechnique and in 1834 went to Holland, but afterwards returned to France, when Arago recommended him to the observatory. On Nov. 22, 1843, he discovered the comet which bears his name, and for this discovery obtained the Lalande prize. He was elected a member of the Academy of Sciences in 1847. In 1848 he was made professor of geodesy at the École Polytechnique, and in 1854 became rector of the Academy at Nancy. In 1873 he was made inspector-general of scientific instruction in the department of secondary education. In 1877 he was elected to the chamber of deputies, and for a few weeks he was minister of public instruction. He has since been inspector-general of higher instruction. He assisted in translating Humboldt's *Cosmos* into French (1846–1859), and published *Leçons de Cosmographie* (1864).

FAYRER, SIR JOSEPH, an English physician, was born at Plymouth, Dec. 6, 1824. He was educated at King's College, London, and the University of Edinburgh, and received the degree of M. D. both at Edinburgh and at the University of Rome, 1849. In 1847 he became assistant surgeon in the navy, in 1849 was transferred to the army, and in 1850 to the East India Company's service. In 1853 he was appointed civil surgeon at Rangoon, and in the same year was sent to Lucknow as residency surgeon. He served with great distinction during the great siege of Lucknow in 1857, and at the relief of Cawnpore. In 1859 he was appointed professor in the Calcutta Medical College, and afterwards held other distinguished positions. In 1872 he became president of the Indian Medical Board and surgeon-general. Among his writings are *Poisonous Snakes of India* (1872); *Tropical Diseases* (1881); *The Tiger; Journal with the Princes*, and various professional works, relating chiefly to questions of climate, to snake-bites, etc.

FAZY, JEAN JAMES (1794–1878), a Swiss statesman, was born at Geneva, May 17, 1794. He was of Huguenot descent and was educated at a Moravian school at Neuwied. He went to Paris to study jurisprudence and became a journalist, but in 1833 returned to Geneva, where he was head of the radical republican party. His efforts resulted in the adoption of a liberal constitution in June, 1842. In the struggle between the Protestant and Catholic cantons in 1846, under the influence of Fazy Geneva joined the former, and thus overcame the Sonderbund. Since Calvin's time no man has had so great power in Geneva as Fazy, yet as in Calvin's case there were ebbs and flows of his influence. Fazy's political career, while in some respects beneficial to the city, was marred by his selfishness and lust of power. From 1855 resistance to his rule increased, and in 1869 he retired from public life. He died at Geneva, Nov. 6, 1878. For many years he was professor of constitutional law in the University of Geneva. His principal publication is *De l' intelligence collective de sociétés* (Basle, 1874).

FECHNER, GUSTAV THEODOR, a German physicist, was born at Gross-Sährchen, in Lower Lusatia, April 19, 1801. He was educated at Soran and Dresden, and studied medicine at Leipsic, but soon devoted himself to the natural sciences. Some of his earliest writings treated scientific problems in a humorous way, and these were afterwards collected under the title *Kleine Schriften von Dr. Mises* (1875). His serious works related to galvanism and chemistry, and in 1834 he was made professor of physics in the University of Leipsic, but he was obliged to resign his chair in 1839, by a disease of the eyes. He then turned his attention to æsthetics and anthropology, and published some volumes of poems of considerable merit. His philosophical writings include *Ueber das höchste Gut* (1842); *Ueber die Seelenfrage* (1861); and *Vorschüle der Æsthetik* (1876). His principal work is, *Elemente der Psychophysik* (1860), an attempt to treat on the principles of exact science the relations between soul and body.

FECHTER, CHARLES ALBERT (1824–1879), a French actor, was born in London, Oct. 23, 1824. His father was a German, and his mother was French. He was educated chiefly in France, and became a sculptor. While thus employed, he appeared on the stage, and the drama soon became his chief occupation. He joined a company which made a tour in Italy, and in 1846 appeared at Berlin. From 1847 he was connected with various theatres in Paris. Among his noted characters was Duval in Dumas's *Dame aux Camélias.* In 1860 Fechter went to England, and gave striking representations of Hamlet, Othello, and other Shakespearian characters. In 1863 he leased the Lyceum theatre at London, but his career as manager involved him in debt. In 1870 he came to the United States, and appeared both in French and English plays. Though highly commended by Dickens and other English critics, he was received with only moderate favor by the American public. In 1872 he opened a theatre in New York for the production of French plays, but soon gave it up. He retired to a farm at Quakertown, Pa., where he died Aug. 5, 1879.

FEDERAL PARTY. The name assumed by that portion of the people of the United States who favored the adoption of the Federal Constitution, and after its ratification in 1789 organized the government and administered it for twelve years. It is difficult for us who are accustomed to view the Constitution as a production of extraordinary political wisdom, and its popular acceptance as an equally marvellous example of intelligent patriotism, to conceive of the difficulty with which it was formed, and the opposition it encountered. Its merits were reasoned before the people with great power in the essays by Hamilton, Madison, and Jay, published in the newspapers, and collected in *The Federalist*, a volume that will never lose its value while the Constitution it defended exists. But there is reason to believe that at the outset a majority of the people were either opposed or indifferent to it. In Pennsylvania, out of an estimated voting population of 70,000, not more than 13,000 votes were cast in the election of the convention which ratified it. The election in Virginia was closely contested. When the conventions met to act on the ratification, that of New York had only nineteen members favorable to the Constitution, to forty-six opposed. The Massachusetts convention, on assembling, had a majority in opposition. That it was finally ratified was due to the able reasoning and masterly tactics of the leading Federalists. If Mr. Jefferson, whose adverse opinion is on record, had been at home, it is doubtful if Virginia could have been carried in its favor; but he was absent as our envoy to France. In the New York convention, the task of turning a small minority into a small but sufficient majority was performed by Alexander Hamilton almost single-handed, and was one of the most memorable achievements even of his commanding genius. In the Massachusetts convention, a proposition for conditional ratification was dexterously modified into an unconditional ratification, with an appended resolution recommending additional articles, ten of which were afterwards adopted, and form the first ten of the existing "Articles of Amendment."

The first party division was thus into "Federalists" and "Anti-Federalists." The Federalists advocated a government having attributes of sovereignty, operating upon the people directly, and having all the powers necessary to its own effective action; the Anti-Federalists favored rather a union of sovereign States in a simple compact of confederation, acting by mutual agreement, not by law operating *proprio vigore*. When the Constitution was ratified further opposition ceased, and the adoption of the first ten amendments removed one of the chief objections that had been urged against it—the want of a bill of rights. The Anti-Federalists then assumed the title of "Republicans," intending, probably, to imply that the Federalists were anti-republican. They regarded it as their mission to defend the reserved rights of the States, by insisting on a very strict construction of all grants of power to the Federal government. The Federalists maintained that their policy asserted no more than the constitutional powers of the United States, and equally stood for the rights of the States. It is certain that the Tenth Article of Amendment—"The powers not delegated to the United States by the Constitution, nor prohibited to the States, are reserved to the States respectively or to the people"—which is the special charter of State rights, was drafted by that distinguished Federalist, Theophilus Parsons, of Massachusetts. In his first administration Washington had both parties represented in his cabinet. But since he adopted habitually the advice of Hamilton, Jefferson retired, and was soon after followed by Randolph, so that the administration became avowedly Federalist. The decorous distinction between the President's supposed impartiality and the party leanings of the cabinet was at length disregarded, and Washington was recognized as a party leader, exposed to the censure and disparagement of the opposition.

The first questions upon which the parties divided were financial: the funding of the national debt; the assumption of the State debts incurred in the struggle for independence; the imposition of taxes to pay the interest of the debt, and to carry on the government; and the establishment of a national bank. These measures were open to exceptions, which the Republicans did not fail to urge; but they prevailed, and received Washington's approval. This system of financial policy, it should be noted, received a double ratification, for the Republicans, when in power, after some tentative deviations, followed in the main these precedents of their former adversaries. Questions of foreign policy supervened, and for a considerable period divided the country, almost to the exclusion of domestic issues. Both parties sympathized with the opening acts of the French revolution, but the Federalists withdrew their sympathy when they proved to be the prelude of a European war, and the President's proclamation of neutrality expressed the determination to keep the United States out of the contest. The Republicans insisted that we were bound by ties of gratitude to France for aid extended in the Revolution, and France claimed that the United States were under treaty obligations to be her ally. It must be confessed that the French had some grounds for this claim, but it was plain that the nation could not, in the weakness of its infancy, cast itself into such a gigantic struggle, but must at any cost keep out of it. A few years later the obligation was acknowledged and the default atoned for. The negotiation of Jay's treaty with England, which secured some part of our just demands, leaving others unsatisfied, aggravated the discontent of the opposition, and an attempt of the House of Representatives to interfere with the constitutional prerogatives of the President and Senate, which the President firmly resisted, cost Washington a loss of popularity which he keenly felt.

John Adams succeeded to the Presidency by a majority of barely three electoral votes. The difficulties with France reached an acute stage under his administration. The French government, by a series of hostile decrees, plundered our commerce, and, when envoys were commissioned to demand satisfaction, refused to treat with them, except on terms too humiliating to be tolerated by national self-respect. The envoys returned, and reported that they had been required to purchase audience with money. The effect was to rouse almost the whole people to the support of the administration. Measures were taken to build a navy. A provisional army was set on foot, Washington was appointed to the chief command, and the enthusiasm of the people rose to a high pitch. At this time the Federal party was at the height of its power. Its downfall was, however, near, and was rapid. The passage of the Alien Act, by which the President was authorized to expel from the country any alien who was deemed dangerous to our peace, and of the Sedition Act, providing special penalties for libelling the President or the government, created wide-spread popular dissatisfaction, and led to the passage of the famous Virginia and Kentucky resolutions of 1798 (of which Mr. Jefferson was the then unknown author), in which the doctrines of nullification and of secession ever afterwards found their justification, until the twin heresies were subdued, at immense cost, in our civil war. These discontents would not, perhaps, have caused the political revolution that followed, had the Federalists continued to be a united party. But Mr. Adams became convinced that Gen. Hamilton and the Federal leaders sympathizing with him desired war. Projects were ascribed to Hamilton for an alliance with Great Britain against France, and for hostile measures against Spain, looking to the seizure of the Floridas, Louisiana, and Mexico.

The President had made the announcement that no minister would be sent to France without an assurance that he would be received in a manner suited to the dignity of the United States. Such an assurance, in the very words of the President, was informally and circuitously given by Talleyrand, upon which Mr. Adams nominated a minister; and, objection being made to him, named three commissioners to reopen negotiations with France. Peace was thus preserved, but, as Hamilton and his friends insisted, at the sacrifice of honor. For this they resolved to defeat the reelection of Mr. Adams. It was not difficult to do this, but it was at the price of the defeat of the Federal party—a fall from which it never rose. Mr. Jefferson's first administration was so tranquil, and the country so prosperous, that he was re-elected with very little opposition, Massachusetts giving him her vote. Then came the war upon our commerce, waged by England and France. In their life-and-death struggle with each other they disregarded the rights of neutral powers, of the United States especially. England added the grievance of kidnapping American seamen to man her navy, under pretence of reclaiming British subjects. We had no navy; the beginning of one in Mr. Adams' administration had been arrested by Mr. Jefferson, and we were in no condition to appeal to arms. Resort was had to an embargo; as its opponents expressed it, our enemies crippled our commerce, and our government killed it. Against this policy the Federal party rallied with much resolution and little strength of numbers. Its chief strength was in New England. When war with England was declared, in 1812, it was against the earnest resistance of Federalists, who found much also to complain of in the policy by which it was directed. Declared mainly on account of injuries to our commerce, in opposition to the commercial States, the defence of these States was neglected, their industries were paralyzed, and they were compelled to bear the heaviest burdens of the contest. It is not to be wondered at as the years wearily passed over them, a passionate sense of wrong led to a doubt of the value of the Union. When a convention of delegates, commissioned by the legislatures of Massachusetts, Connecticut, and Rhode Island, with some local representatives from New Hampshire and Vermont, met at Hartford, in 1814, it was strongly suspected that a plot against the Union was hatching. But the delegates were commissioned to consider and declare their grievances, and to propose measures for redress "not repugnant to their obligations as members of the Union." The assertion that they had treasonable designs concealed under these professions was vehemently urged, and for a long time believed, but it rested on no evidence, and is not now credited. The grievances they alleged were the power over the State militia claimed by the Federal government; the raising of troops by conscription, and the enlistment of minors without the consent of parents. Amendments to the Constitution were proposed: to base representation on free population; to declare the President ineligible for a second term; disqualifying persons of foreign birth from holding office; limiting embargoes, in every case, to 30 days; requiring a two-thirds vote of both Houses of Congress to admit new States, to declare war, or to interdict commercial intercourse. Such were the fell devices of the famed Hartford Convention. Its members were among the most honored citizens of their respective States, but they became the objects of popular suspicion, and were ostracised from all elective offices. One or two of them sat in the Senate, or occupied honorable positions on the judicial bench, but many years elapsed before men's minds were calm enough to weigh their merits with candor. As for any political effect from their deliberations, their meeting was too late. They fulfilled the prediction of Josiah Quincy, that "the outcome of the convention would be—a great pamphlet." Their messenger, on his way to Washington with their memorials, was met with the tidings of peace with Great Britain. With this announcement the issues of war and embargo disappeared from our politics, to be speedily followed by the disappearance of party divisions in "the era of good feeling," which followed the election of Pres. Monroe.

The Federal party, as a party of administration, ended with the accession of Pres. Jefferson, in 1801. Its record up to that point, with the exception of the Alien and Sedition laws, was highly honorable. The party embraced a very large proportion of the constructive ability required for the formation, establishment, and practical operation of our constitutional system, and continued in power for a sufficient time to get the machine running smoothly. One of the last acts of Mr. Adams was to appoint John Marshall Chief-Justice of the Supreme Court, which, under the lead of his clear and massive intellect and eminent judicial faculty, became the defence of the Constitution and held the balance firmly between the powers granted to the nation and the powers reserved to the States. This administrative history is the brighter page in the record of the party. It is marred by some narrowness of judgment and some weaknesses of feeling. Abhorrence of demagogism led them into the opposite extreme of something like contempt or distrust of popular opinion. Some of them had an almost hysterical fear and dislike of the French. They so far identified Mr. Jefferson with the Jacobins of the French revolution as to predict, and, we may not doubt, in sad sincerity, that his election would be followed by a reign of terror and a war upon Christianity. The very excess of these alarmist outcries, when contrasted with the actual results of the change of administration, contributed to the reaction that followed. As a party of opposition, the Federalists were less wise and less fortunate. Their opposition was so indiscriminate as to be factious. Above all, when we were at war with England, a war that put in peril our very existence as a nation, opposition seemed unpatriotic. For twenty-five years after the peace, in the feeling of a large portion of the people, the name of Federalist was as odious as that of Tory had been in the Revolutionary war, and long afterward. Now that our great civil war has made obsolete all political issues of the preceding period, and it is possible to review our earlier party history with calmness and impartiality, the Federal party, as above all others, the framers of our national government, and of an administrative system which became traditional and survives essentially to this day, receives the honor that is due to so transcendent a public service.

For the adoption of the Constitution the chief authority is George Bancroft's *History of the Formation of the Constitution* (2 vols.). See also J. B. McMaster's *History of the People of the United States*, and *Life of Alexander Hamilton*, by J. T. Morse, Jr. Some interesting incidents of the Massachusetts Convention are given in the *Memoir of Chief-Justice Parsons*, by his son. For the administrations of Washington and Adams, see McMaster and Morse as above; *The Life of John Adams* (Vol. I. of his *Life and Works*), and Gibbs' *History of the Federal Administrations*. The Federal view of the embargo and the war of 1812, including the Hartford Convention, may be seen presented in an interesting way in the *Life of Josiah Quincy*, by Edmund Quincy, and more fully in the *History of the Hartford Convention*, by Theodore Dwight, and the *History of New England Federalism*, by Henry Adams. (L. E. S.)

FENCES, Law of. Stone walls, hedges, and fences of board, pickets, rails, or wire fastened to posts driven into the ground, are corporeal hereditaments belonging to the land to which they are attached. When standing on division lines separating adjacent lands they are the joint property of adjoining land-owners, who are charged with the duty of keeping such partition fences in good repair; but portable fences of any kind are personal property the title to which does not pass with the land on which they rest.

In New York and other Eastern States land protected by a substantial fence and occupied by a claimant without title to the land is deemed in adverse possession, and a conveyance of such land by the owner thereof is void.

In most of the Western States a conveyance of land in adverse possession is not void, but no writ of ejectment will issue against the occupying claimant until his fences and other improvements have been appraised and paid for.

Wherever the common law has not been modified by statutory enactments or municipal ordinances permitting cattle to run at large, the owner of land is not bound to fence it against trespassing animals, and may distrain such animals, or recover damages from their owner; but against cattle lawfully grazing on common land and permitted to roam at large the land-owner must protect his crops by sufficient fences, and cannot recover for injuries done by cattle breaking into his close unless protected by a fence of the character described by statute, or one of equal capacity to turn cattle.

Statutory provisions regulating fences differ according to the character of the localities for which they are made; and the question of sufficiency, as well as all controversies about rights in fences and duties in relation to their erection, maintenance, and removal, are usually referred to fence-viewers, who are the trustees or selectmen of the townships for which they have been elected.

In Illinois justices of the peace have jurisdiction over fences and in all controversies between adjoining land-owners on this subject.

In Iowa a fence made of three rails of good substantial material, or three boards not less than 6 inches wide and ¾ inch thick, or of three barbed wires with not less than 36 iron barbs of 2 points each to the rod, or 26 iron barbs of 4 points each to the rod, or of four wires two of which are so barbed, the top wire, board, or rail not more than 54 inches and not less than 48 inches, and the bottom wire, board, or rail not more than 20 inches and not less than 16 inches from the ground, fastened to good substantial posts not more than 10 feet apart where rails are used, not more than 8 feet apart where boards are used, and not more than 2 rods apart with two stays between, or 1 rod apart with one stay between where wire is used, or any other kind of fence, which in the opinion of the fence-viewers is equivalent thereto, is deemed a lawful fence.

By act of Congress fences around the premises of distilleries must not exceed a height of 5 feet, and by act of the Iowa legislature barbed wire fences are forbidden on the grounds of public schools, and on private land within 10 feet of the boundaries of school-house lots since Sept. 1, 1884.

But dumb beasts following their natural instinct may still be lacerated and killed by such barbarous fences with impunity, and the annual loss, especially of horses, caused thereby is very considerable in the aggregate without redress to their owners.

In the absence of any special agreement between adjoining land-owners about their partition fences it is the duty of each, so long as he improves his land, to keep up and maintain such fences in equal shares; and in case of any one neglecting to do so the aggrieved party may make all necessary repairs and recover therefor from the delinquent party; but neglect cannot be imputed until after an assignment of shares and notice to repair by the fence-viewers, and an action of trespass cannot be maintained for injuries suffered from a neglect to repair fences.

In North Carolina and other Southern States all persons, not only planters, are subject to indictment for not keeping their fences in good repair as required by statute.

In Iowa and other Western States, when a controversy arises between the respective owners about the obligation to erect or maintain partition fences, either party may apply to the fence-viewers, who after due notice to each party may assign to each his share thereof, and designate the time within which each shall erect or repair his share in the manner designated by the fence-viewers, and for any neglect thereafter the aggrieved party may recover double costs of the repairs made by him for the other.

A land-owner not occupying his land nor using it otherwise than in common is not obliged to contribute toward the erection or maintenance of fences between him and adjacent owners; but when he encloses his land for private use, and joins his fence to partition fences previously erected by adjacent owners, he becomes liable for one-half the value of such partition fences and for the future maintenance of his share thereof.

A person desiring to enclose his land independent of adjoining owners may do so by leaving a strip of not less than 20 feet wide all along his boundaries open for common use by the public; but before he can move his part of a partition fence for such purpose he must give the adjoining owner six months' notice of his intention to do so.

In some States only three months' notice is required in such case, and the removal of a division fence without such notice entitles the injured party not only to actual damages sustained in consequence of such removal, but empowers him also to restore the fence at the expense of the offending party.

When lands owned in severalty have been enclosed in common without a partition fence, and one of the owners desires to occupy his in severalty, and the other refuses or neglects to divide the line where the fence should be built, or build a sufficient fence on his part of the line when divided, the party desiring it may have the same divided and assigned by the fence-viewers, who may designate in writing the manner and time in which such fence shall be built; and either party neglecting to comply with the decisions of the viewers, the other party after making his own part of the fence may make the other part also at the expense of the delinquent party; but disputes about the true location of a boundary line cannot thus be settled by fence-viewers.

When a division of fences between adjoining owners has been made, either by fence-viewers or by agreement in writing recorded in the township where their lands are situated, the owners, their heirs and assigns are bound thereby and must support the fences accordingly; but if any one desires to lay his lands in common and not improve them along the fence so divided, he may give the required notice and then proceed as in the case where lands owned in severalty have been enclosed in common, and such proceedings remit the parties thereto to their common law rights.

In such cases the term "owner" applies to the occupant or tenant when the owner does not reside in the county, and such proceedings will not bind non-resident owners unless notified; and when the partition fence is on a township line, and the parties in controversy reside in different townships, one fence-viewer at least must be taken from that of the party complained against.

Fences may be placed so as to stand partly on one side and partly on the other side of a division line, and the owner of the fence may remove the same as if it was wholly upon his own land; and where a fence has by mistake been placed wholly upon the land of an adjoining owner, such fence may be removed by its owner after the true boundary line has been established and payment of any damages to the soil caused thereby, or a tender thereof, has been made; and, where parties cannot agree as to amount of such damages, the same may be determined by the fence-viewers; but such fences made of material taken from the land on which they stand must not be removed until such material also has been paid for, nor at a time when their removal would expose the crops of an adjoining land-owner.

For work done and material furnished for fences or other improvements and not paid for when due, a lien may be obtained on such improvements and on the land owned or occupied by the party for whom the improvements were made, which liens take precedence over prior incumbrances of the land.

Fences in public highways obstructing travel are deemed public nuisances, and may be abated as such, and parties maintaining them are subject to indictment; but, for the purpose of protecting growing hedges on abutting lands, fences may be set out into the highways 5 feet on each side, 6 months prior to planting such hedges, and may be maintained there for 10 years afterwards, before they become nuisances.

Travellers on a highway out of repair and fenced on both sides may open the fence on either side and go through an adjoining close around an impassable obstruction in the highway without being liable for trespass.

In controversies about the original location of lost corners and boundary lines, fences, hedges, and rows of trees set out when the original corners were still in existence are taken as *prima facie* evidence that they were set out by such corners on the true boundary line, and control the courses and distances of field-notes of surveys and descriptions in conveyances, but do not absolutely establish such boundaries except by prescription, and ordinarily only shift the burden of proof on the contesting party.

In California 16 years of acquiescence in a fence originally built as a division fence estops all parties from controverting the correctness of its location. In most other States the period is 20 years.

Railroad companies as a general rule are not bound to fence their right of way, but they are liable for injuries to stock run over by their trains, which are sometimes wrecked, thereby causing more serious injuries to life and property, for which they are also liable; and, as a matter of self-protection and economy, railroad companies generally erect fences and provide crossings with cattle-guards as soon as practicable, whether obliged to by law or not. Provisions in their charters requiring fences are for the benefit of adjoining landowners only, and merely place the corporation in the position of a proprietor who is bound by contract or prescription to build the fence between himself and adjoining owners.

The grantor of a right of way through his land to a railroad company is not bound to fence it, nor is the company under any legal obligation to do so, and neglect in this respect renders the company liable for injuries only arising solely from that cause.

Care and diligence required of railway companies in constructing fences and cattle-guards depend upon the locality of the road, and negligence for not fencing cannot be imputed where a road runs over common, vacant, or unenclosed lands, but where required to fence by municipal regulations and failing to do so, they are liable for injuries without contributory negligence.

Fences built by mistake or design upon government land are the property of the government, and pass to a subsequent patentee with the land on which they stand, and a removal of such fences by the party erecting them or any other unauthorized person is trespass.

Since 1875 immense tracts of public lands have been unlawfully enclosed in western States and Territories by a new species of nobility—cattle-barons and their cowboys—organized into powerful syndicates for the patriotic purpose of supplying the poor people of England and America with cheap beef, and appropriating the public lands of this country to their own exclusive uses as pastures for their large herds of cattle.

Upon the principle that the end justifies the means, leases were obtained by them from Indians; here and there isolated entries were made by roaming cowboys under the homestead, timber-culture, and desert-land acts, or with spurious land-scrip; now and then a Mexican land-grant of uncertain dimensions and a township or two of railroad land were added, and then the whole area, comprising entire counties and in some instances populous towns, was enclosed by substantial fences, barring highways, streams, lakes, and mountain passes and stopping free intercourse, until at last Pres. Cleveland issued a proclamation against their unlawful proceedings and ordered the army to remove from the public domain all trespassing herds of cattle and cowboys, and all fences which had become public nuisances. But the end of this struggle has not yet been reached. Similar encroachments upon the public lands of the ancient Roman republic by the patricians led to the enactment of agrarian laws designed to limit the individual right of pasturage upon public lands and of acquiring title thereto, and to arrest the absorption of small freeholds by large corporate estates.

The law of fences, growing ever more complicated with the progress of civilization, is with us to-day one of the many other causes which are gradually and silently undermining the existing small freeholds of the common people in this country, and rendering future acquisitions of such by people of small means ever more difficult. And with the loss of a people's hold upon the soil, their independence invariably disappears.

Under the Mosaic law every forfeited freehold was restored free and clear of all incumbrances to the original owner or his heirs in each year of jubilee, and a revival of some such custom seems necessary for a preservation of the free institutions of our republic.

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Illinois Reports.—2, 178, 215; 10, 130; 15, 341; 20, 334; 39, 186; 45, 76.

Indiana Reports.—9, 290; 14, 371.

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Kentucky Reports.—3 *Dana*, 154; 6 *Dana*, 290; 3 Bush., 547.

Maine Reports.—2, 72; 5, 357; 13, 371, 428; 22, 541; 29, 282, 336; 34, 332; 39, 526; 50, 86.

Massachusetts Reports.—4, 471; 6, 90; 11, 294; 16, 36; 15 *Pick.*, 123; 14 *Pick.*, 276; 2 *Metc.*, 180; 4 *Metc.*, 589; 11 *Metc.*, 496; 1 *Cush.*, 11; 2 *Cush.*, 536; 6 *Cush.*, 396; 1 *Allen*, 450; 6 *Allen*, 437.

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New Jersey Reports.—1 *Law*, 53; 3, 662; 5, 547; 9, 384; 13, 229; 18, 368; 18 *Eq.*, 54.

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Ohio Reports.—3 *O. St.*, 172.

Pennsylvania Reports.—2 *Miles*, 247; 2 *Pa. St.*, 126, 488; 18, 367; 20, 138; 23, 316; 25, 187; 27, 95; 32, 55.

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Vermont Reports.—18, 425; 22, 480, 565; 25, 116; 31, 450; 34, 336; 38, 678.

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Miscellaneous Reports.—6 *Peters*, 498; 6 *Wheat.*, 580; 111 *U. S.*, 228; 18 *Cal.*, 351; 33 *Cal.*, 351; 70 *Maine*, 305; 50 *Iowa*, 237; *Am. Dec.*, 5, 586; 20, 678; 34, 80; 36, 556; 42, 648; 49, 268–272.

Code of Iowa and Session Laws.—1880–1884, Tit. XI., Chap. 4. (F. H.)

FENTON, Reuben E. (1819–1885), an American Senator, was born at Carroll, Chautauqua co., N. Y., July 1, 1819. He studied law, but early engaged in business. In 1853 he was elected to Congress as a Democrat, but he joined the Republican party on its formation in 1856. In Congress he took high rank, being chairman of the committee on ways and means. In 1863 he was elected governor of New York, and held this office till 1868, when he was chosen United States Senator. Through dissensions in his party he lost, in 1872, the political power he had held for many years. He was a member of the international monetary conference in 1878. He died Aug. 25, 1885.

FERGUSON, Sir Samuel, an Irish poet and story-writer, was born at Belfast in 1810. He was educated at Trinity College, Dublin, and became a lawyer. He attracted attention in 1832, by his poem, "The Forging of the Anchor." To *Blackwood's Magazine*, in which this appeared, he also contributed an amusing dialogue, called "Father Tom and the Pope," and to the *Dublin University Magazine* a series of stories, called *Hibernian Nights' Entertainment*. In 1859 he was made Queen's Counsel, and in 1865 received the degree of LL. D. from the University of Dublin. In that year he published *Lays of the Western Gael*, and in 1872 *Congal*, an epic poem. In 1878 he received the honor of knighthood.

FERGUSSON, James, a Scotch writer on architecture, was born at Ayr, in 1808, and was educated at the High School of Edinburgh. Entering into commercial pursuits, he went to India, where he devoted much time to the rock-cut temples. In 1845 he published an illustrated work on this subject, and afterwards other works, whose chief features were finally embodied in his *Cave Temples of India* (1880). Besides his works on the architecture of India he published *Palaces of Nineveh and Persepolis Restored* (1851), and an *Essay on the Ancient Topography of Jerusalem*. His *Hand-book of Architecture* (1855) was afterwards enlarged into *A History of Ancient and Modern Architecture* (3 vols. 1865). His work on *Tree and Serpent Worship* (1866), magnificently illustrated, was published at the expense of the Indian Government. He advocated the substitution of earthworks for masonry in fortifications, and in 1859 he was appointed a member of a royal commission on the defences of Great Britain.

FERLAND, Jean Baptist Antoine (1805–1864), a Canadian historian, was born at Montreal, Dec. 25, 1805. He was educated at Kingston and the College of Nicollet and admitted to holy orders in 1823. After serving as secretary to Bishop Plessis and as professor in the College of Nicollet he was ordained priest in 1828. He held several charges until 1848, when he was called to the archbishop's palace at Quebec. In 1855 he was made professor of history in Laval University, and he was afterwards dean of the faculty. He published several works on the history of Canada, *A Voyage to Labrador*, *A Voyage to the Coast of Gaspé*, and a *Life of Bishop Plessis* (1863). He died at Quebec, Jan. 8, 1864.

See Vol. IX. p. 89 Am. ed. (p. 100 Edin. ed.)

FERNS. A large group of acrogenous plants, constituting the order *Filices* of De Jussieu. They are partly tree-like, with leaves or fronds rising from the apex; and partly herbs, with fronds rising from a rhizome or underground stem. The fruit consists of cases containing *spores*, most usually seated on the under surface or at the margin of the fronds. The spores differ radically from seeds, and develop, on reaching the ground, into a secondary organism, the *prothallium*, upon which the sexual organs arise. To these, by a subsequent act of fertilization, the fern plant is due. About 2500 species of ferns have been described, though probably many more exist. They are widely spread, ranging from the tropics to near the frigid limit of vegetable life, and to a height of 15,000 feet in the tropics. Most of them may be classed as herbaceous perennials, with seasons of growth and rest in accordance with the nature of their climate. They vary considerably in size, many being as small and as delicate in texture as mosses, some few of shrub-like aspect, while about 150 species resemble trees, some of them growing to a height of more than 50 feet. Ferns have few economical properties, either as food, as medicine, or in the arts. The pith of *Alsophila excelsa*, a large tree-fern, is greedily eaten by hogs, and the wood used for building, it being hard, fireproof, and exceedingly durable. The Maidenhair fern is said to derive its name from a syrup made from it called *Capillaire*, and used for hair-dressing; or perhaps from the slenderness and delicacy of its stems. The common *brake* is used as a food in some countries. There is a superstitious idea that the burning of it will bring down rain. Few ferns grow in dry or flat countries. They need moisture for abundant growth. Of North American ferns 70 species were named by Nuttall in 1820. Since then the number has been more than doubled. In 1879 the species known north of the Mexican boundary numbered 143. The peculiar climbing fern of the Eastern States is the only species of this genus found in the United States. About sixteen other species of this genus are known, mostly tropical, and none reaching so high a latitude as the one above named. (C. M.)

FERRY. A passage across a river or stream, which, in the absence of a bridge, is traversed on a ferry-boat. The boats range all the way from the flat-bottomed scow, propelled by a pole, to the large and expensive steam ferry-boats seen on the New York ferries.

A *flying bridge* is a ferry where the boat is held by a rope fastened up stream, which, under the action of the current, is made to cross a river in the arc of a circle, the rope being made fast at the centre of the circle. Sometimes a wire rope is stretched across the stream, high enough to be out of the way of floating objects when the stream is swollen. On this cable runs a small trolley from which lead two ropes to the ends of the boat. By hauling in one rope till it is shorter than the other, the boat is placed at an angle with the direction of the current, so that there is a resultant force due to the action of the current, which propels the boat across the river toward the side of the shorter rope or upstream end of the boat. A bridge of pontoons or boats is also called a flying bridge, and is often quickly improvised in time of war for the passage of troops across streams that are not fordable.

Much of the same nature as the two first mentioned examples of flying bridges is what is termed the *floating bridge*. A good example of this type of bridge is to be seen at Portsmouth, England, where a large flat boat is drawn across the ferry to Gosport by means of a chain lying on the bottom of the river. This chain passes in at one end of the boat, thence around a sprocket wheel turned by steam, and out at the other end. By turning the wheel in the proper direction the boat is drawn across to the required side. Such a bridge does not, of course, depend on the action of the current, while the chain is out of the way of passing vessels.

FERRY, Jules François Camille, a French statesman, was born at Saint Dié, Vosges, April 5, 1832. He studied law at Paris and was admitted to the bar in 1854. He soon joined with other young lawyers in harassing the imperial government. After contributing for some time to the *Gazette des Tribunaux* he became, in 1865, one of the editors of the *Temps*, in which he exposed the extravagance of Baron Haussmann in the rebuilding of Paris. In 1869 Ferry was elected to the *Corps législatif* as a radical democrat. On the downfall of the empire in September, 1870, a government of national defence was formed, of which Ferry was made secretary. There were internal as well as external foes, and on Oct. 31 he displayed great energy in putting down the communist insurrection at the Hotel de Ville. After the capitulation of Paris he retired from the government, but was elected to the national assembly from the Vosges, and in May, 1872, he was sent as minister to Greece. Ferry returned to the national assembly in 1876, and he was more than once vice-president of that body. He was the leader of the Republican left and in numerous speeches insisted on radical changes in public education, elections, and municipal administrations. Cautiously but steadily the Republican party moved forward from one victory to another, until in January, 1879, they had a majority in both chambers and were able to compel the retirement of Marshal MacMahon. On Feb. 5, 1879, M. Grévy, the new president, called Ferry to his cabinet as minister of public instruction and of the fine arts. His new law for higher education, proposed in March, 1879, required the complete exclusion of the unrecognized religious orders from the work of education. Article 7 was especially aimed at the Jesuits, who then had 27 colleges in France with 848 teachers, though there were also other communities affected having a still larger teaching force. Article 7 was struck out in the Senate, and thus modified the bill became a law. However, M. de Freycinet, then prime minister, declared the purpose of the government to enforce the old laws against the Jesuits. Such difficulties were experienced that a ministerial crisis ensued, and in September, 1880, M. Ferry was made president of the council. In the beginning of 1881 the French government sent an expedition to Tunis. Though this movement brought Tunis completely under French control, the costly and corrupt management of army affairs produced a revulsion of popular feeling. M. Ferry was compelled to resign Nov. 10, 1881, and Gambetta was called to assume the responsibilities of prime minister, but before three months had elapsed he also retired. M. de Freycinet then formed a cabinet with M. Ferry as minister of public instruction and worship, but this ministry also resigned in July, 1882. M. Ferry had in the meantime, on March 28, secured the passage of a law completely secularizing primary education.

FERTILIZERS. Substances which, when applied to the soil of any locality, supply it with the elements in which it is deficient, are called fertilizers. Such substances may be of organic or of inorganic origin, and the applicability of any particular fertilizer depends chiefly upon the nature of the soil to which it is applied, but to some extent upon that of the crop which it is intended to raise.

Plant Food and its Sources.—All organic life, whether plant or animal, primarily depends upon the four elements, oxygen, hydrogen, carbon, and nitrogen. But in the solid tissues of both plants and animals other materials are required, and plants use variable quantities of potash, phosphorus, silicon, iron, calcium, magnesium, chlorine, and sodium. All these substances are procured either from the air or from the soil. The air is an inexhaustible source of oxygen; carbon is taken up by the leaves from the carbonic acid which is always present in the atmosphere; hydrogen is absorbed in the form of water, chiefly by the roots, but to a certain extent by the stems and leaves; and nitrogen is to a great extent derived from the compounds of nitrogen produced in comparatively small quantities in certain electrical conditions of the air. Although nitrogen forms the greater portion of the air, it seems that plants are quite unable to use it in its pure or uncompounded state, but are dependent for their supply entirely upon nitric acid, ammonia, and the nitrates—substances which are as a rule rare both in air and soil. The first essential of a soil, from an agricultural point of view, is, therefore, that it contain nitrogen; but certain soils may be poor in other necessary elements or compounds, and may therefore need a different treatment. As has been shown, the four elements which are present in all living tissue are derivable either directly or indirectly from the air, which supplies the rainfall, and is the source of the rare nitrogen compounds. But no plant can be brought to perfection unless nearly all of the elements before mentioned are present. Phosphorus is one of the most important of these; sulphur is, as well as nitrogen, an essential constituent of all the albuminoid bodies to be found in every growing plant-cell, and the compounds of the four metals, potassium, calcium, magnesium, and iron, are universally present in the ashes of plants, and no plant can be brought to maturity when any of them is absent, yet but little is known concerning their action. Potash is always present along with starch, cellulose, and other carbo-hydrates, and is most abundant where those compounds are in greatest proportion, but the real connection between the two is at present unknown. Iron seems to be essential to the proper development of the chlorophyll grains of the leaves.

Many plants contain other elements, which may, in some cases, serve useful purposes, but do not seem to be essential to the vital processes. Thus silicon is often deposited in the cells of certain plants, especially cereals, giving rigidity to their stems; chlorine seems to be of advantage to many plants by favoring the translocation of starch granules, yet is injurious in excess; and sodium, though present in the ashes of many plants, does not seem essential to the growth of any.

The Origin of Soils.—To understand why fertilizers are needed, it is necessary to know something of the origin and nature of soils. All exposed surfaces of the earth's crust, however hard, however tenacious, or however soft, are perpetually subjected to influences which decompose them or wear them away. Water and air, aided by carbonic acid, and by other substances present in them, perform the work of disintegration, and thus, if every particle stayed near the spot from which it came, the entire land surface would be covered by a layer of loosely compacted material or soil, which would be fitted or unfitted to support plant life, according to the substances which the local rocks might afford. But the action of gravity, of running waters, and to a smaller extent of winds, does not permit the disintegrated particles to remain where they were formed. Gradually they are washed or blown downwards into the hollows between the rocks or into the valleys, leaving the higher rocks bare and still exposed to the decomposing influences of the air and moisture. The mingled materials borne into the valleys are usually rich in plant food, and were the home of generation after generation of plants before man appeared upon the scene to claim the soil for the culture of plants specially suited to his wants. Uplands—that is to say, the gentle slopes of rolling land, terraces, and the foothills of mountain ranges—have a thinner soil, yet are often covered in a state of nature with thick forest or luxuriant herbage. Many broad plains, though covered with disintegrated material, are barren, either from lack of water, or from the absence of some necessary constituent of the soil. The materials which are most common and most universal in most soils are silica or flint, alumina or clay, oxide of iron, and lime; for these are the most abundant materials in the rocks of which the earth's crust is composed. Soils which contain these materials very often have also an ample supply of magnesia, potash, and soda, for these also enter into the substance of all the older rocks of the globe. But over large areas of the land surface the surface rock may be composed chiefly of one mineral, which has during geological ages been separated from the others. Sandstones may cover one extensive tract, limestones another, while a third may be clay. Evidently a soil formed in a limestone area is likely to be rich in lime and carbonic acid, the materials of limestone, but poor in other necessary substances; while a soil derived from sandstone will be mainly powdered silica or sand—and so on. But in a large proportion of the soil-covered areas a sufficiency of the necessary elements to support plant life exists, and the growth and death of many generations of plants has added to the original soil a store of materials best fitted to supply other generations of plants. Animals, ever present where there are plants, upon which they mainly depend for sustenance, add, both during life and after death, their materials to the soil. By the action of life the rare nitrates are stored up in the surface soils ready for plant use. (See AGRICULTURAL GEOLOGY, Vol. I., p. 74.)

The Needs of Soils.—Man, having become predominant upon the globe, needs an annual growth of certain plants to supply him with food, and also wishes to cultivate plants which yield fibres, timber, etc. Of many of these needs he has found a plenteous store provided, and has used it wastefully, so that he is now beginning to see the need of economy, and to study the laws of plant growth.

The fruits, vegetables, and cereals which are fitted to his use, man has long grown upon soils which at first possessed a sufficiency of the necessary elements. But as he each year took away from the soil, by harvesting his crops, a much larger portion of nitrogenous and other matter than was returned to it by plant decay, he long ago learned the need of applying some fertilizer which should prevent the soil from becoming utterly barren. The first fertilizer thought of, the only one which is of universal application, and the only one in universal use, was MANURE. (See Vol. I., p. 97.) Under this term may be included every form of decomposing animal or vegetable matter, brought to such a condition that it is susceptible of ready mixture with the soil. As knowledge of the nature of soils progressed, it was found that other things than the presence of sufficient organic matter were needed to make a good soil, and gradually there grew up a demand for fertilizers which should supply to the soil the exact element it lacked. Moreover, as population increased, the need for additional food production prompted the effort to bring under cultivation lands which seemed barren. It was found that many such soils needed only water, hence IRRIGATION (*q. v.*) has been practised from very early ages. Other soils, however, needed phosphorus, others lime, while almost all soils could be stimulated to increased production by the application of nitrates.

From what has been said it is evident that there may be sandstone soils lying upon sandstone, sandy soils which no longer rest on the parent rock; clay soils from clay slate, shales, etc., either in situ or transported to a distance; limestone soils derived from the decomposition of limestone or dolomite; pebbly or gravelly soils from fragments of any kind of rock; loamy soils, containing mixtures of sand and clay; marly soils, mixtures of lime and clay; or admixtures of these in any proportion.

From this complexity in the nature of soils, coupled with the fact that different crops assimilate different proportions of the various constituents, it follows that it is no easy matter, in many cases, to properly regulate the use of fertilizers. A knowledge of chemical facts is far from universally diffused, while the practical application of those facts is known to comparatively few. Thus fertilizers are often misapplied. An excess of nitrogenous or phosphatic matter may be present in the soil, and the crops may be starved through the lack of one of the elements which they require in smaller quantity. Thus such fertilizers as guano and bone-dust do not supply a sufficiency of potash to the soil. So long as soil is dressed only with ordinary farmyard manure, there may be a deficiency in total quantity, but the relative quantity of each fertilizing element is that required by plants. When, therefore, guano or bone-dust is used for several years on soils containing their normal amount of potash, such soils necessarily in a few years become so poor in potash that they no longer yield a good crop. The addition of potash to such a soil, rich in nitrogen and phosphorus, will cause it to produce much larger crops than can be obtained by the use of any other fertilizer. Potash usually acts favorably upon a sandy soil, or on one which is non-absorbent, and has little effect on heavier soils which are likely to be rich in potash. Potash manures are usually employed mixed with lime or gypsum. These latter materials, as well as most marls, do not, like nitrogenous and phosphatic fertilizers, act directly as nutriment, but stimulate growth by their indirect action upon the soil. They benefit a crop by dissolving, setting free, or replacing substances that were before in a condition unavailable for use. Thus carbonic acid has a solvent effect on silicates and nitrates; and when a soil contains potash in an absorbed or insoluble state, a solution of lime will release a part of the potash, the lime being retained in its stead. The addition of the soluble salts of lime to the surface will set free other salts contained there, and these freed salts will then sink deeper, and be brought within reach of plants having deeply penetrating roots.

Quicklime, carbonate of lime, and marls also promote the decay of vegetable matter, and cause the production of humus with its peculiar acids. *Humus*, or vegetable matter in the soil, in process of decomposition, is not so directly a source of plant nutriment as was once thought, but acts *physically* by rendering the soil more porous, and a better absorber of heat and moisture; and *chemically* by introducing a ceaseless chemical activity by which those constituents of the soil which are capable of further change are decomposed, and the actual plant food (potash, phosphoric acid, etc.) they contain is set free and rendered available, and by which ultimately some at least of the nitrogen of the humus itself is converted into ammonia or nitric acid.

Natural Fertilizers. Guano.—On many islands and coasts comparatively unvisited by man sea-birds have lived in countless numbers for long ages, and their excrements, mingled with the remains of their bodies and of their food, form extensive accumulations. In similar situations seals and sea-lions have their breeding places, and their excretions and remains occasionally form appreciable beds. These beds of organic matter are exported under the name of guano. From its origin guano is rather a manure than a fertilizer, and it contains phosphorus and lime as well as nitrogen and some potash. The proportion of phosphates and nitrates contained in commercial guano depends chiefly upon the rainfall of the region in which it has accumulated. A group of small islands known as the Chinchas, situated in a rainless region off the coast of Peru, for many years furnished nearly all the commercial guano. When the deposits found on these islands were practically exhausted, the Macabi and Huanape islands, and Ballestas group, etc., were worked, but these for the most part yielded a product inferior in nitrogen to Chincha guano. Nevertheless Peruvian guano is still acknowledged to be the most excellent of fertilizers, since it contains from 25 to 30 per cent. of ammonia and phosphoric acid.

Guano or "Huano" was used long ago by the Indians of Peru, but was not introduced into Europe until Liebig's writings had drawn attention to the importance of fertilizers. The regular trade commenced in 1842, and in 1862 there were 435,000 tons exported. England and France are the greatest consumers of Peruvian guano, but it is used to some extent in every quarter of the world. The best qualities of Peruvian guano are of a light yellow or coffee brown, do not weigh more than 60 lbs. per bushel, and consist of a fine grained powder containing small lumps. The softer lumps contain ammoniacal salts, while of the harder ones some are highly phosphatic and others highly siliceous. Analyses show considerable variation, but the presence of any considerable excess of moisture proves damage either by rain or by sea-water on the voyage, and is accompanied by a loss of ammonia.

From the coast of Bolivia a guano is exported which is rich in phosphates but comparatively poor in nitrogen, and other guanos of a similar nature are procured from the West Indian Islands, under the names of the Curacoa, the Sombrero, and the Navassa, and from Ichaboe and other islands on the west coast of Africa, as well as from the Pacific Islands. These guanos are to a large extent lime phosphate. The animal remains are exposed to rains, which wash out the ammonia and the phosphates, but when the deposit lies upon limestone phosphate of lime is formed below and is the chief ingredient in the exported material. Bat guano is often found in caverns, but does not exist in sufficient quantities to be of commercial importance.

The following will give an idea of the constituents of various Peruvian guanos, as compared with Bolivian phosphatic guano :

	Angamos.	Chincha.	Pabellon de Piea.	Punta de Lobos.	Bolivia.
Moisture	11	16	17	16	13
Organic matter combined with water	53	52	45	34	23
Whereof is nitrogen equal to ammonia	17.5	17	12	7.5	4
Tricalcic phosphate	19	22	19	29	42
Phosphorous pentoxide in alkaline salts	1	[illegible]	4	3	3
Alkalies, etc., by difference	9	6	12	13	12

Bolivian guano is put up for the trade under five different brands, the best warranted to contain an average of 10 per cent. of ammonia, while the second is guaranteed to average 6 per cent. The lumps contained in guano must be crushed before using, and treatment with sulphuric acid is not only necessary with the more phosphatic varieties in order to convert the phosphate into superphosphate, but is also useful to render the ammonia non-volatile.

Guano may be applied broadcast, but a time should be chosen which will be followed by rain, and it should always be mixed with from two to four times its bulk of sifted earth, mould, plaster, etc., before use. This mixture renders certain its more equal distribution, and prevents it from being blown away by the wind. It should never be mixed with ashes or lime, with bone-dust, or with superphosphates, but may advantageously be combined with stable manure.

Nitrates.—Nitrate of soda exists native as part of an earth called *caliche* or *terra salitrosa*, which abounds in the district of Atacama and the formerly Peruvian but now Chilian province of Tarapaca. The caliche forms a layer from ten inches to five feet thick, stretching over a length of forty leagues, and is covered by "lostra," a hard conglomerate from half a metre to two metres in thickness. It contains from 48 to 75 per cent. of nitrate of soda, and from 20 to 40 of common salt, associated with small proportions of iodate of soda, organic matter, etc., suggesting the idea that the bed was formed from excrementitious animal matter, probably from the guano deposits which covered the shore of a great soda lake. The caliche is worked on the spot for crude nitrate of soda, which is exported under the name of "Chili saltpetre." Nitrate of soda occurs also in comparatively small quantity in Humboldt co., Nevada, and some other spots in the great basin, as well as near Chihuahua, in New Mexico and Mexico.

Nitrate of potash (saltpetre) occurs native in India and other parts of the world, including many of the western and south-western States, and the western Territories. It is in use as a fertilizer, but is more expensive than the sodium nitrate, from which the greater part of that used in this country is manufactured. The sodium nitrate is treated with German potassium chloride, and the two by interchange form saltpetre.

Phosphates.—*Apatite*, a phosphate of lime, occurs in many of the older crystalline rocks, but the great beds of phosphorites, as the "Phosphorites de Quercy" of France, and the phosphatic rocks of South Carolina and Florida, belong to a later age. Apatite is found in small quantities in many parts of the United States, and was formerly mined for agricultural purposes in Essex co., N. Y., and in Sussex co., N. Y. Extensive deposits exist in Ontario and Quebec, and in 1882 17,000 tons were shipped to Europe and 5000 to the United States for fertilizing purposes. (See APATITE, Vol. I., p. 260.) The supply of phosphates for this country now comes from an area on the coast of South Carolina, 70 miles long and 30 in greatest width. The most accessible deposits are situated at a radius of about eight miles from Charleston. The formation is of the upper eocene age, like that of the marls which lie below it. It is an ocean ooze which was raised above the surface, and in pliocene and post-pliocene ages formed the surface of the country. Thus the bones of various land animals became mingled with the casts of shells which are its proper fossils. It is believed by some that the bed owes its origin to the action of the fecal matters of extinct land quadrupeds upon the calcareous marl which lies below. The layer most used for fertilizers is one containing hard nodules of lime phosphate, the softer phosphate in which they occur being ignored. The composition is as follows :

	Per cent.
Phosphoric acid	20—30
Carbonic acid	2—10
Lime	30—45
Magnesia	1— 2
Silica and sand	2—25
Organic matter	1— 7
Moisture and water of composition	1— 3

Together with small quantities of sulphuric and fluoric acids, sesquioxide of iron, and ammonia. Alumina may be present sometimes to 3 per cent. The phosphate of lime is in tribasic form and the average rock shipped contains 53 to 60 per cent. A light-colored soft rock which has been quarried for building purposes in Florida contains 16 per cent. of phosphoric acid. The total product of washed phosphate mined in South Carolina in 1883 was 332,077 gross tons.

Phosphatic deposits have also been found in Alabama, both in the cretaceous strata and in two horizons of the tertiary, viz., the lower portion of the oligocene and the centre of the lignite eocene beds. The cretaceous phosphate beds extend into Mississippi.

Coprolites.—*Coprolites* are lumps of phosphate of lime which are really the fossilized excrements of extinct animals. They are found in considerable quantities in Bohemia, France, England, etc. They vary greatly in composition and usually contain much alumina and iron oxide. They are not used directly as phosphatic fertilizers, but are employed in the manufacture of low grade superphosphates.

Gypsum.—Sulphate of lime or gypsum, the material from which plaster of Paris is made, is tolerably abundant in most parts of the world, including the United States. Its use is chiefly in the arts, but it is also often employed as a fertilizer. Gypsum furnishes plants with two substances, lime and sulphuric acid, of which they need a small quantity, but as it is beneficial in soils which have an abundance of these substances, it must have some other action, either fixing the volatile salts of ammonia or replacing and setting free other bases as previously described.

Salt has in some cases been found valuable as a stimulant.

Marls are strictly calcareous clays, but the term has also been applied to the greensand or glauconitic beds which occur near the seacoast of the United States at various points from New Jersey through Delaware, Virginia, North and South Carolina to Alabama, Mississippi, and Louisiana. Along nearly all the Atlantic seaboard and Gulf States marine calcareous marls are also found, also in Arkansas and Texas. Greensand occurs also in Tennessee. These beds belong to the cretaceous and eocene formations, but small beds of marls of recent age are found in many of the

Eastern States. Analyses of New Jersey marls gave the following result:

	Per cent.
Phosphoric acid	1.02— 3.87
Sulphuric acid	0— 1.89
Silicic acid and sand	37.70—59.80
Carbonic acid	0 — 6.13
Potash	3.53— 6.32
Lime	1.26— 9.07
Magnesia	1.50— 3.95
Alumina	6.00—10.20
Oxides of iron	11.98—25.23
Water	6.85—10.00

From the presence of phosphoric acid and potash in notable proportions, it is evident that greensand marl is not merely a stimulant but an actual fertilizer.

The calcareous marine marls of South Carolina do not average above a third of one per cent. of phosphoric acid, and about one per cent. of potash. Their value is, therefore, chiefly due to the lime and carbonic acid which form more than 90 per cent. of their bulk, except where there is an admixture of silica. Apart from purely chemical properties, the application of marl may cause a desirable physical change in the soil, as when a clay marl is spread upon a sandy soil, or a sandy marl upon a heavy clay soil.

Kainite, etc.—Since 1858 large quantities of salts of potash have been exported from the salt mines at Stassfurth, Germany. The principal of these is a double sulphate of potash and magnesia known as *kainite*, and containing from 15 to 18 per cent. of potash. In its natural state it contains much chlorine, which is by treatment with alcohol separated as chloride of magnesium. This and other potash-salts form the upper covering of the rock salt deposit at Stassfurth. Many preparations containing a higher percentage of potash are made by concentrating the crude salts.

Artificial Fertilizers.—Besides these natural fertilizers large quantities of artificial ones are now made from various kinds of organic waste, and also from the natural fertilizers. Among those valuable chiefly for the nitrogen they contain is "*fish guano*," consisting of the refuse of fish, crabs, and other marine animals. As a fertilizer this can be made to have a value little inferior to that of Peruvian guano. Unfortunately it is not made solely from waste materials, but from the product of a fishery which consumes a large quantity of edible fishes or of fishes which form the food of edible fishes. Other nitrogenous fertilizers are hides, hair, the flesh of animals, blood, hoofs, wool, and feathers. In some parts of South America, where animals are slaughtered for their hides alone, or for meat extract, the greater part of their bodies is worked up into a preparation which is called guano, and contains about 7 per cent. of nitrogen and 13 or more of phosphoric acid. Skin, horns, hair, hoofs, and similar substances, on account of the slowness with which they decompose, are before application subjected to the action of superheated steam, after which they are easily reduced to powder. Still another commercial fertilizer is "*poudrette*" or dried human excrements. This is largely used in France, and in smaller quantities in other countries. In amount of nitrogen it is far superior to farm-yard manure, and the comparatively small use made of a substance the disposal of which in every other way is dangerous to health, can only be attributed to lack of civilization. Manufactories of poudrette are supposed to be a nuisance, and it is certain they could not be tolerated near to a city, but a civilized society would utilize, either in a liquid or a solid form, the whole of the sewage which we in our proud barbarism pour into our drinking waters. In this respect we are far behind the Chinese and Japanese, who return all such material to the soil, and thus succeed in cultivating land for many centuries without impoverishing it as much as, for instance, the lands of California were impoverished by twenty years of constant cropping without fertilization.

Phosphatic blood guano is made by combining with dry powdered blood which yields 16 per cent. of ammonia, a quantity of bones dissolved in acid and ground with the addition of potash and soda. Vegetable refuse, such as cotton seed, oil-cake, the waste from breweries, starch-manufactories, sugar-works, etc., are also used as fertilizers. The oil-cake contains 3 to 4 per cent. of nitrogen, 3 to 4 of phosphoric acid, and 1 to 2 of the alkalies.

One of the chief phosphatic fertilizers is formed from the bones of animals, which contain, when dry, about 60 per cent. of lime phosphate. These are used simply as bone-dust, or, by treatment with sulphuric or hydrochloric acids, have their bone phosphate converted into superphosphate, with the production of chloride or sulphate of calcium, according to the acid used. As the sulphate of calcium (gypsum) is more beneficial to the soil than the chloride, sulphuric acid is generally used.

The action of the superphosphates upon land is not simply nutritious, but stimulating, on account of the contained gypsum. It will, therefore, tend to exhaust a soil unless ammoniacal salts, greensand, potash salts, or other nitrogenous or alkaline materials are added, as is done in some commercial artificial fertilizers, the analysis of one of which (bone-dust phosphate) is appended:

	Per cent.
Soluble phosphoric acid	5.64
Insoluble " "	3.76
Reverted " "	6.47
Alkali	4.77
Ammonia	3.41

The advantage of the superphosphate is, that it is soluble in water, while bone phosphate is not. It is thus readily dissolved by the rains and evenly disseminated through the soil. Though it is speedily carried back again into the insoluble form by contact with the constituents of a normal soil, it is presented to the plant in a far more available state than can be attained by the finest state of mechanical division. What is known as reduced or reverted phosphoric acid is in combination with iron, alumina or lime, and though no longer soluble in water, is quite soluble in dilute acids. This reverted acid is considered by chemists nearly as valuable as the soluble portion.

Precipitated phosphate of lime is a by-product in the manufacture of glue, and like bone-dust is basic or bone phosphate. In some manufactures a more soluble neutral phosphate, with 35 to 42 per cent. of phosphoric acid, is produced.

The phosphates are very beneficial to pastures, and to crops which are cultivated for their roots or tubers.

Ashes.—Wood-ashes contain about 5 per cent. of potash; indeed, it is claimed that unleached wood-ashes from timber grown on strong land contain 7 per cent. Such ashes are also rich in lime, phosphoric acid, silica, magnesia, and iron. Ashes of turf or peat have but 3 per cent. of potash. Leached ashes are without potash, yet are still useful from the phosphoric acid they contain.

The production of artificial fertilizers in this country during 1880 amounted to 727,453 tons, with a value of $19,921,400. (W. N. L.)

FESSENDEN, William Pitt (1806–1869), an American statesman, was born at Boscawen, N. H., Oct. 16, 1806, being a son of Gen. Samuel Fessenden. He graduated at Bowdoin College in 1823, and was admitted to the bar in 1827. He began practice at Bridgeton, Me., but in 1829 removed to Portland, where he became noted in his profession. He was elected to the legislature in 1832 as a Whig, but afterwards declined political position until 1840, when he returned to the legislature. In the next year he was elected to Congress, and in 1843 was the Whig candidate for U. S. Senator, but was defeated. He served again in the State legislature in 1845, 1846, and in 1853. In 1854, during the movement to exclude slavery from the territories, the Free-Soil Democrats united with the Whigs in electing Fessenden to the U. S. Senate. In this body he achieved a prominent position as a speaker and a debater, and when the Republican party was organized he was one of its leaders. In February, 1861, he was a member of the Peace Congress at Washington which tried in vain to avert the war. He was then chairman of the finance committee of the Senate, and he succeeded S. P. Chase as secretary of the treasury in 1864. On account of impaired health he relinquished this position a year later and resumed his place in the Senate. He was still prominent in the councils of the Republican party until 1867, when, during the impeachment of Pres. Johnson, he was one of the seven Republicans that voted for his acquittal. He died at Portland, Me., Sept. 8, 1869.

FESSLER, Joseph (1813–1872), an Austrian prelate, was born at Lochau, Tyrol, Dec. 2, 1813. He studied theology at Brixen and was ordained priest in 1837. In 1841 he became professor of church history and canon law in the seminary at Brixen, in 1852 professor of church history in the University of Vienna, and in 1856 professor of the decretals. In 1861 he went to Rome to assist in conducting the affairs of the oriental churches. On April 7, 1862, he was nominated by the pope bishop of Nyssa *in partibus*. He was made bishop of St. Pölten March 27, 1865. He was general secretary of the Vatican Council in 1869, and afterwards published a defence of its action, *Die wahre und die falsche Unfehlbarkeit der Päpste* (Vienna, 1871). His principal work is *Institutiones patrologicæ* (2 vols., 1850–52). He also published *Sammlung vermischter Schriften* (Freiburg, 1869). He died April 25, 1872.

FEUILLET, Octave, a French novelist and dramatist, was born at Saint Lô, department of Manche, Aug. 11, 1812. His father was secretary-general of the prefecture and sent his son to Paris, where he was educated at the College of Louis le Grand. In 1845 he was called to assist Bocage and Aubert in preparing *Le grand Vieillard*. Having once begun to write he poured forth a stream of novels, romances, vaudevilles, and comedies which were long received with favor. His most noted novel was *Le Roman d'un jeune homme pauvre* (1858), which by the excellence of its description of French provincial life and by the purity of its moral tone gained great popularity throughout Europe. *Histoire de Sibylle* (1862) was almost equally successful, and called forth from George Sand a reply. His later works, *Monsieur de Camors* (1867), *Julia de Trécoeur* (1872), *Un Mariage dans le Monde* (1875), were written in the realistic style which had come into vogue under the Empire. They attracted attention, but did not increase his reputation.

See Vol. IX. p. 109 Am. ed. (p. 125 Edin. ed.).

FEVERS.—A. This name denotes disorders characterized by elevated temperature and hurried pulse. Those which belong particularly to warm climates are separately classified, and treated in this article. Small-pox and Measles, with the closely related Chicken-pox and Roseola, will be treated in separate articles. Fevers are all regarded as contagious, the contagium being enormously multiplied in the human body, to which it gains access mostly by the air-passages in breathing, but in some cases by the alimentary canal in food or drinks. The nature and mode of action of fever-poisons are not definitely settled. They are generally regarded as living entities, the favorite theory being that they are microscopic fungi, collectively known as bacteria, and classed according to form as micrococci, spirilla, and bacilli.

Each malady has regular periods of incubation, invasion, progress, and decline, but the later stages are more variable in symptoms and duration than the earlier. The most characteristic are the eruptive fevers, in which varied inflammatory conditions of skin and mucous surface are attributable to local action of specific poisons in escape from the superficial capillaries.

1. *Scarlet Fever* (*Scarlatina*).—Until about 200 years ago this eruptive fever was not distinguished from measles. It is less contagious than small-pox and measles, but the contagium is singularly persistent when undisturbed in fomites. Young children are more susceptible than adults, but the latter suffer more seriously. The period of incubation is short, but by no means uniform.

Like other eruptive diseases, it commonly begins with a chill, headache, and vomiting. Sore throat is a prominent symptom. In young and delicate children convulsions sometimes occur. The temperature is high and pulse very rapid. On the second day a scarlet rash appears on the chest and rapidly extends over the body, but the skin remains smooth. From the fourth to the sixth day the fever usually declines, the rash begins to fade, and on its disappearance desquamation takes place during a period varying from a few days to six weeks.

Three different types of scarlatina are recognized: 1. *S. simplex*, very mild, in which the rash is the prominent symptom, though there are cases in which it is scarcely noticeable; 2. *S. anginosa*, in which the throat is highly inflamed and sometimes ulcerated, the nasal passages being also involved; 3. *S. maligna*, falling with greatest severity on the nervous centres, with delirium, stupor, or convulsions, and early dissolution.

The sequelæ of scarlatina are especially numerous and grave: such as ulcerations of the throat, extension of inflammation from throat to middle ear, resulting in chronic obstruction of the Eustachian tube, caries of bony structure, and permanent deafness; chronic nasal catarrh; chronic ophthalmia; rheumatism, affecting various joints and sometimes the valves of the heart; inflammation of the tubular structure of the kidneys, resulting in albuminuria, uræmic poisoning, and dropsy.

Mild cases do well without medication; severe ones require treatment adapted to special symptoms. Strict confinement in-doors during the period of desquamation should be enforced for the safety of the patient, and for preventing the infection of others. Oily applications to the skin prevent itching and irritation and the scattering of the infectious scales.

2. *Diphtheria* (*Membranous Croup?*).—There is presumptive evidence of the ancient prevalence of diphtheria, in the writings of many authors from the time of Aretæus (about A. D. 100); but the first clear description was made by Bretonneau of Tours in 1821, since which time its literature has grown voluminous. It is an open question whether diphtheria and membranous croup are varying forms of the same disorder, or two distinct maladies. The common symptoms are fever and a fibrinous exudation of a grayish-white color upon mucous surfaces. In croup the exudation is limited to the larynx and trachea. In diphtheria it commences in the fauces and may be confined to that tract, but often extends into the nares and trachea and appears sometimes on remote mucous surfaces, or even the abraded skin. Invasion of the larynx is known by huskiness of voice, advancing to total extinction, and a hoarse, ringing cough, with expulsion of moulded casts of false membrane.

In all cases the onset is insidious, and the first recognized appearance of illness may be invasion of the larynx, almost certainly resulting in suffocation. Under best opportunities for observation, it is found that the period of incubation is quite indefinite, and the course of the disease widely variable. That diphtheria is not merely a local disease is proved by early appearance of albuminuria in a majority of cases, and by frequent occurrence of local paralysis after subsidence of the acute symptoms. The disease is always attended with great prostration and convalescence is slow. The contagiousness of diphtheria is universally admitted, while those who hold membranous croup a distinct disease are not agreed upon its communicability. Young children are much more susceptible to both than adults, but one attack confers no immunity.

The most important measures of treatment consist in supporting the strength by appropriate food, tonics, and stimulants, and in dissolving the fibrinous membrane by a warm spray of lime-water or diluted lactic acid. The utility of tracheotomy for relief of impending suffocation is questionable. It does not arrest the malady, and consent to the operation is rarely obtained in season to do any good.

3. *Typhus Fever* (*Ship*, *Jail*, *Hospital*, *or Camp Fever. Spotted Fever*).—The conditions under which typhus arises and becomes epidemic are the crowding of people into badly ventilated quarters and the presence of animal filth. Undoubtedly infectious, it is communicable only for a short distance, through the breath of the sick and not their excretions; but the virus may be long preserved and carried far in fomites excluded from the air. Typhus is far less prevalent now than formerly, owing to better hygienic conditions, and has scarcely appeared in the United States for more than 20 years.

Persons are susceptible at all ages, but it is most common between 15 and 25 years. Immunity is almost certainly conferred by one attack. The latent period is commonly 5 to 12 days, but is not restricted to either limit.

The attack commences with chilliness, followed by fever seldom above 105° Fahr. From the fourth to the seventh day an eruption resembling that of measles appears on the chest and abdomen, and gradually extends over the whole surface. It begins to fade in 3 or 4 days and disappears about the end of the second week. The bowels remain rather constipated, the tongue becomes dry, sordes collect on the teeth, the intellect is dulled, and the patient often passes into a state of coma-vigil, unconscious, but with open eyes. During the third week, unless convalescence occurs earlier, the pulse becomes extremely feeble and quite rapid, the muscles tremulous, the prostration excessive, and control is lost over the evacuations. In rare instances the case terminates fatally within a week, with active delirium or profound stupor. Death may take place from exhaustion, or a refreshing sleep may supervene, followed by gradual recovery. Under the age of 20 years the mortality is usually only 5 or 6 per cent., while between 50 and 60 years it is nearly 50 per cent., and in old age much more.

Post-mortem examination shows the quality of the blood much impaired, but discloses no organic lesions. As the nature of the disease clearly indicates, the most important measures of treatment consist in the best practicable ventilation and the support of the vital powers by liquid nourishment, of which alcoholic drinks form a most important adjuvant. Removal of filth, personal cleanliness, and free ventilation are effectual preventives.

The foregoing maladies are more prevalent and severe in cool climates than in warm, in the cold months than in the hot. The explanation is that under a high temperature free ventilation produces attenuation of contagia. The importance of thorough disinfection of apartments by sulphur fumigation, after termination of sickness, cannot be overestimated. All articles of bedding and clothing used about the sick must be included. Such as can be wet may be placed in a solution containing 4 oz. sulphate of zinc and 2 oz. common salt to a gallon of water and boiled. All discharges from the sick, particularly from the throat, should be disinfected with a stronger solution, or one of corrosive sublimate, 1 part to 500 of water. These precautions apply particularly to small-pox, scarlatina, diphtheria, and typhus fever.

4. *Enteric Fever* (*Typhoid Fever*).—The distinction between typhoid and typus fevers was made about 1830, by the discovery of an inflammatory affection of Peyer's glands in the small intestine as an essential lesion of enteric fever. In fatal cases these glands are found ulcerated, and in some instances the whole thickness of the intestinal walls is perforated. No period of life is exempt, but about four-fifths of the cases occur in persons under 25 years of age. The poison is undoubtedly reproduced in the bodies of the sick, and is communicated only by the alvine discharges. The usual mode of infection is through drinking water obtained from wells, springs, or small streams, which have been contaminated by the dejections of the sick.

The onset is marked by a few days of malaise. In the early stage there are irregular chills, alternating with flushes of heat, lassitude, and pains in the limbs and back, thirst and want of appetite, headache, with sometimes drowsiness by day and wakefulness at night, occasionally vomiting and diarrhœa. During the second week the fever becomes continued, the abdomen is tympanitic, with gurgling or pressure in the right iliac region, and at this time usually a few rose-colored spots, about the size of a pin's head, appear upon the abdominal surface, soon fading and succeeded by others. Throughout the course of the disease the alvine discharges are loose and have the appearance of pea-soup. The temperature varies from 102° to 106°. There is a daily remission from 12 P. M., succeeded by a corresponding elevation after 12 M. In severe and prolonged cases profound nervous disturbances ensue: delirium, tremors, picking at imaginary objects, deep stupor. Emaciation and prostration become extreme. Death results from gradual exhaustion, or from the rapid inflammation following intestinal perforation and escape of contents into the abdominal cavity; or the fever may abate any time from the 21st to the 60th day, and the patient slowly recover.

During adolescence light cases sometimes occur, terminating in 10 or 12 days, and these are often mistaken for febricula or remittent fever; while in young children it is probable that mild enteric often passes under such names as "worm fever," "gastric fever," "bilious fever," etc.

No specific treatment is appropriate. It is of vital importance to husband and sustain the vital powers. Milk and alcohol are invaluable resources. Medication must be adapted to each case as symptoms arise, not with a view of arresting the disease, but of conducting it to a safe termination. Thorough disinfection of the alvine discharges is an indispensable preventive measure.

5. *Relapsing Fever* (*Famine Fever*).—Until within the last half century typhus, typhoid, and relapsing fever were all included in the common term *continued fever.* Relapsing fever, like typhus, is epidemic in character, and associated with overcrowding, filth, and insufficient food. It is likewise highly contagious, through the breath of the sick, and transportable in fomites. Unlike typhus, it has no eruption, it is attended with enlargement of liver and spleen, and one attack does not confer immunity. It has prevailed in various parts of Europe and Africa and in India, and once in the United States during the winter of 1869–70.

After a latent period, varying from 2 to 16 days, the subject is seized with a chill, accompanied by severe pains in the head, trunk, and limbs. A fever follows, ranging from 104° to 108°, which declines in 3 to 6 days. In about a week subsequently another attack of fever similar to the first generally occurs, and sometimes a third after another interval. The average mortality is less than 5 per cent. Convalescence is protracted, but generally without sequelæ.

6. *Influenza* (*Epidemic Catarrh*).—This disorder prevails during the colder months, and few escape an attack as often as it appears, for immunity is never acquired. After a short but indefinite latent period, a moderate fever sets in, accompanied by severe nasal catarrh, gradually extending down the bronchial passages, with suffusion of eyes, headache, and cough. The attack usually lasts from 4 to 12 days, leaving protracted debility. It is never fatal, save as a complication or with feeble subjects.

7. *Hooping Cough* (*Pertussis*).—The respiratory organs are chiefly affected, but an essentially nervous char-

acter is indicated by the spasmodic cough. Few children escape it, but adults are susceptible, and in rare instances have it a second time. After an uncertain period of incubation, there is a slight febrile action, with an ordinary catarrh and cough. In about two weeks the cough becomes paroxysmal and spasmodic, recurring from 2 to 50 or 60 times in 24 hours, which seems to be provoked by the presence of tenacious mucus in the trachea. The cough consists of expiratory efforts to detach this mucus, so rapid as to nearly exhaust the lungs of air, followed by a long inspiratory act, with the peculiar sound which gives it name. In the warm season the cough runs its course in 4 to 6 weeks, but in winter it lasts until settled warm weather. The spells of coughing frequently end with vomiting, which seriously interferes with nutrition. On account of severe and repeated shocks to the chest and abdomen, from violence of cough, it becomes a grave complication of any intercurrent malady. Among direct effects of the cough are pulmonary congestion, running into lobular pneumonia, collapse of vesicular tracts, producing solidification, and rupture of air-cells, resulting in emphysema. Much of this mischief may be obviated by appropriate remedies and careful protection from the cold air.

8. *Mumps* (*Parotitis*).—This is also a disorder incident to children, on account of its great contagiousness, but all ages are susceptible. The period of incubation is believed to be about 14 days. The essential feature is inflammation of the parotid salivary glands, one only being occasionally affected. This gives rise to moderate fever, drowsiness, headache, swelling of neck and throat, with great difficulty of motion and pain in swallowing. The inflammation often extends to the submaxillary glands, tonsils, and fauces; rarely to the testicles or mammary glands. The complaint runs its course in 1 to 2 weeks. As there is no danger of suppuration of the inflamed glands, warm fomentations or poultices are appropriate and alleviating to the pain.

B. Fevers of Warm Climates.—These fevers belong especially to those regions where a warm temperature prevails throughout the entire year, and those portions of the temperate zones where a high temperature lasts during a great part of the year. Prolonged freezing weather surely arrests them, and where this prevails most of the year they are unknown.

1. *Malarial Fever.*—The term is derived from *malaria* (bad air), which has long been used to express the cause of the malady. *Paludal* and *miasmatic* have also been used as distinguishing terms, but with less propriety, inasmuch as the fever prevails in many localities far distant from marshes, and the word miasm includes all air-borne poisons. The distinguishing feature of the disease is periodicity, or recurrence in separate paroxysms. While the tendency of most disorders due to specific causes is to a single attack, terminating either in death or permanent and complete recovery, and in many instances pursuing a definite course regardless of remedial agents, this malady, if not positively interrupted, has an indefinite duration, with progressively aggravated symptoms.

The terms intermittent and remittent are applied to two types of the fever, which differ in severity and distinctness of paroxysmal character. The former, being less serious, is marked by total disappearance and reappearance of symptoms in regular order. The onset is sometimes abrupt, but generally preceded for several days by pains in the head, back, and muscles, constipation, and loss of appetite. The paroxysm is often ushered in with a short period of yawning and stretching, followed by a chill, which may last from a few minutes to several hours, and of every grade of severity from the faintest chilly sensation to the most violent rigor, icy coldness of surface, and total insensibility, sometimes running into coma and death without reaction. During this stage the superficial blood-vessels are contracted, and a corresponding accumulation of blood occurs in the interior organs, particularly the spleen and liver. The blood-vessels of the kidneys, lungs, brain, mesentery, and stomach are also liable to engorgement, resulting in albuminuria or hæmaturia, pulmonary congestion, sometimes developing into pneumonia, delirium or coma, dysentery or bloody vomiting, according to the organ congested. Repeated congestion in the spleen frequently results in such an enlargement of that organ as to have given rise to the term "ague-cake," and sometimes in the liver abscess of that organ occurs.

The fever which follows ague is a reactionary struggle to restore the circulation to its equilibrium, in which there is a determination of blood to the surface. This leads to excessive secretion of the sweat-glands, constituting the sweating stage, during which the temperature of the body declines and the paroxysm ends. The interval between the disappearance of fever and the next paroxysm is called the period of apyrexia, which varies according to duration of paroxysm. The period between the beginning of one paroxysm and the beginning of the next is called the interval. When this is 24 hours the intermittent is styled quotidian, when 48 hours, tertian, and when 72 hours, quartan. Irregular types occasionally occur, such as the double quotidian, with two paroxysms in 24 hours; the double tertian, with daily paroxysms, beginning at different hours, or, rarely, with two on one day and none on the next, etc. The relative frequency of the regular types of intermittent may be approximately stated as 52 per cent. of quotidian, 47 per cent. of tertian, and 1 per cent. of quartan; but this varies at different times and localities and in different persons. In intermittents not checked by suitable treatment the interval of the paroxysm frequently becomes shorter, while retardation, or lengthening of the interval, is likely to follow insufficient doses of antiperiodics. Vomiting is quite frequent in the early stage, becoming bilious when often repeated. Great drowsiness ensues in the second stage. The chill generally takes place between sunrise and mid-day; rarely during the night.

The congestive or pernicious form of malarial fever, which may be either intermittent or remittent, is characterized by excessive determination of blood to such vital organs as the nervous centres, resulting in coma or convulsions sometimes suddenly fatal, or the kidneys, resulting in suppression or bloody urine. The term *dumb ague* is applied to those cases of intermittent in which the cold stage is imperceptible. Oft-repeated paroxysms of malarial fever are exceedingly destructive to the red blood-globules, attended with ashy pallor, great prostration, and frequently jaundice and dropsical swelling of the extremities.

The remittent form of malarial fever, often called bilious, or bilious remittent fever, generally begins with a cold stage, which is less violent and prolonged than in the intermittent. As in the other form, the body-temperature varies from 101° Fahr. to 108°, and this only partially declines before another access occurs. The duration of the paroxysm may vary from 12 to 72 hours, and the next one, if not modified by treatment, is likely to be more severe and prolonged. With suitable and timely management a remittent is speedily suppressed or moderated into an intermittent and then arrested, while a neglected remittent will run into a continued form, with only a slight decline in the early morning hours, lasting several weeks and rebellious to any medication. Bilious vomiting, headache, and delirium are more marked than in the intermittent form; anæmia, jaundice, and dropsical effusions are more pronounced; a chronic cachexia often ensues, and convalescence is liable to be slow.

Malarial complications occur with a great variety of other diseases in regions where this fever prevails. These are characterized by periodic access of fever or periodic aggravation of some symptoms belonging to the main ailment. Complication with typhoid fever produces the so-called "typho-malarial" fever, which was so common among the troops during the American civil war as to be regarded by some observers as a new and distinct disease. A periodic form of neuralgia, occasionally becoming continued, is a well-recognized result of malarial poisoning, often easily but sometimes with difficulty amenable to medication.

Malarial fever and malarial complications of other diseases are most prevalent in the later summer and autumn months, and in most parts of the temperate zones disappear or greatly decline during the winter season. In the low regions of the tropics, especially near sea-marshes, the shores of lakes, and sluggish streams, malaria is ever active. Strangers from high grounds and cooler climates are more susceptible to the malarial poison than those who have always breathed it, but it is doubtful if mankind ever become fully acclimatized to this miasm. Nothing is more certain than the destructive effects of malaria upon the health and energies of those permanently subjected to it. This is proved by a high rate of mortality and general cachectic appearance of the inhabitants of malarious regions.

The settlement and cultivation of new grounds in most parts of the world have been effected with enormous cost of human health and life. Disturbance of the soil during the hot months is found far more detrimental to health than in the cold season, and in some localities this is regulated by law. The presence of primeval forests and of a luxuriant vegetation counteracts this miasm. Resinous trees are believed to afford great protection by the generation of ozone, and the planting of the *Eucalyptus globulus* especially has been found an important prophylactic in climates warm enough to favor its growth. But the thorough and prolonged cultivation of the soil, with drainage of the subsoil, has been found to bring about the gradual disappearance of malaria. On the other hand, the cultivation of lowland rice, which requires the flooding of grounds for a portion of the season, followed by their drying, has made regions malarious to a serious degree, which were before far less so, or were entirely exempt. A remarkable reappearance of malaria in the valley of the Connecticut River, after disappearance for several generations, is a recent fact which has not been satisfactorily accounted for.

Experience shows that the malarious influence may be carried by winds to the distance of several miles, and it has been found that the first hills some distance from rivers and lakes are more malarious than the grounds closely bordering. Malaria is far more active at night than by day. Crews of vessels land with impunity by day on the fever-stricken coast of Africa, but are ordered aboard before sunset some miles off shore. The citizens of Charleston, S. C., visit the country by day with confidence, but dare not pass the night out of town. A belt of forest, or an intervening expanse of water, will often give protection from the miasm. In malarious localities considerable immunity may be gained by avoidance of the outer air at night and by sleeping in upper rooms.

There seems to be a definite relation between the complexion of races of mankind and their susceptibility to malaria. The fair races of the North are most susceptible, and the African race least so. Negroes of pure blood are less liable than mulattoes, but the negroes of the United States have partially lost the immunity enjoyed by their ancestors in Africa.

The nature of malaria, save in relation to its effects, was a complete mystery until about the middle of the present century. The three conditions of heat, moisture, and vegetable decomposition have been commonly assigned as the efficient and indispensable causes. A temperature above 60° Fahr. is certainly necessary to render a region malarious, but fevers may occur after the temperature has fallen considerably lower. Malarial fevers have developed on arid grounds, though probably underlaid by abundant moisture, which indicates that vegetable decomposition is not an essential condition. The thorough desiccation of malarious grounds and their prolonged submergence have been found to eradicate malaria. The theory that gaseous emanations of any kind are the true essence of malaria is simply speculative. The same sulphuretted and carburetted gases which are accused, when inhaled in non-malarious localities produce no paroxysmal symptoms.

Prof. John K. Mitchell, M. D., of Philadelphia, has the credit of originating the theory of the cryptogamic origin of malarial fever, which he published in 1849. Prof. J. H. Salisbury, M. D., of Cleveland, Ohio, in 1866 published his researches on this subject, and announced the discovery of a palmella, which he cultivated and experimented with. Having taken some boxes of earth, in which he had planted this vegetation, to the sleeping-room of some young men in a healthy locality, they were soon affected with intermittent fever. It is proper to say that subsequent researches by other medical men in the same line of study have given negative results, until the remarkable announcement, in 1879, of the discovery of the bacillus malariæ in the neighborhood of Rome by Klebo and Tommasi Crudeli. This bacillus is a microscopic fungus, found in the lower strata of atmosphere and soil of malarious localities, and has been cultivated in other soils. Inoculations of these bacilli under the skin of dogs are said to have been followed by the usual symptoms of intermittent fever, including enlargement of the spleen, and the bacilli have been found in that organ. They are also found in the blood of persons during the invasion of fever, but at the acme the spores only appear. Though this theory has not been fully confirmed by other investigators, it is quite in line with the accepted doctrine of the material cause of the specific contagious diseases. It is also in harmony with the recognized properties of the most efficient remedial agents for the cure of malarial disorders—the cinchona alkaloids and arsenic, which are destructive to low vegetal forms.

In the present state of our knowledge, the mode of action of these supposed bacilli must be conjectural. Inasmuch as malaria is found to be highly destructive to the red blood-globules, it may be supposed that the bacilli or their spores, having gained access to the body through the lungs or the alimentary canal, easily reach the capillaries, where they attach themselves to the blood-globules as a favorable soil for their growth. Their enormous multiplication and increase of bulk in a short time would obstruct the capillaries and cause the blood to accumulate in the larger vessels, producing the habitual congestion of certain organs; while the speedy decay of the bacilli, after their consumption of the blood-globules, would allow the circulation to return to the capillaries and the surface of the body. In the later stage spores only are found in the blood, which may soon germinate and produce a new crop of bacilli, followed by another paroxysm of fever, going through the several stages as before. It is possible that a period of about twenty-four hours suffices for the growth and maturity of a crop of the bacilli, coincident with the quotidian paroxysm, while two generations may be necessary in other cases, thus constituting the tertian type, and so on. In the remittent form we may suppose that the bacilli are in various stages of growth at the same time with some fluctuations, while in the continued form all regularity of growth and decay has disappeared, and all stages are in operation at the same time. During the cold stage, refrigeration of the body is confined to the surface, where the volume of blood is diminished. Elevation of temperature is partially explained by rapid oxydation or consumption of the bacilli, while they disappear from the blood in the intermittent form; whereas this process is constantly going on in the remittent and continued forms. This hypothesis accords with the known diminution of the red blood-globules, with the depletion of the capillaries and repletion of the large vessels, followed by reaction, and with the general laws which govern organized matter.

Other points relative to malarial fever must be barely alluded to. The cinchona alkaloids and arsenic are the most valuable curative and prophylactic remedies, while the former, together with strychnia as a general tonic, and preparations of iron as blood-restoratives, are important to establish convalescence. In many cases, however, no positive and permanent recovery can be gained without removal from the miasmatic clime.

2. *Yellow Fever.*—There is no evidence that this disease was known by Europeans prior to the discovery of America by Columbus. Historical indications exist of its presence in San Domingo in 1493, in Porto Rico in 1508, on the Isthmus of Panama in 1514, in Guadaloupe in 1635, at Havana in 1648 and 1655. It has been conjectured that this disease was brought to the West Indies in slave-ships from Africa, but it prevailed on several of the islands before slaves were brought from Africa, and hence it would appear to have pursued the opposite course. Yellow fever was first recognized as a distinct disease in the greater Antilles at or near the time they were first visited by white men, and from this region it has radiated ever since in the lines of commercial intercourse. In this way it has extended (at one time or another) along the

eastern coast of the mainland from Montevideo to Halifax and up the St. Lawrence to Quebec. It has repeatedly scourged Spain, extending far into the interior, has visited Marseilles, and reached as far eastward as Leghorn. England and France on the Atlantic have been touched by the disorder, but it has never gained a firm foothold in either country. All the West Indies have been more or less ravaged in earlier times. On the Pacific coast of America this fever has extended beyond the isthmus, only since the first third of the present century, to Callao on the south and Guaymas on the north.

In the United States yellow fever has visited New York 63 times, from 1668 to 1873, and has been six times epidemic; it has appeared 10 times at Boston, 1691–1858, and was epidemic in 1798; at Philadelphia 34 times, 1695–1870, and epidemic 9 times; at Charleston 52 times, 1699–1871, and epidemic 17 times; at Norfolk 18 times, 1747–1855, and epidemic twice; at Savannah 9 times, 1807–58, and epidemic in 1858; at Pensacola 23 times, 1764–1882; at Mobile 26 times, 1705–1878. There is some evidence that yellow fever appeared at New Orleans in 1769 and again in 1791, but it was first epidemic in 1796. Since the last date there have been few years without cases, but many in which the number has been very small, all traceable to direct importation. Since 1858 general epidemics have occurred in 1867 and 1878. In the United States its ravages have been mostly confined to seaports and towns in the interior accessible by steamboat navigation. In 1878 only it extended along railway lines in many directions through Mississippi, Tennessee, Kentucky, and Alabama.

In the United States yellow fever has never prevailed at a higher altitude than 500 feet above the sea. It has never occurred at Jalapa, Mexico, 4330 feet above sea-level, nor at Maroontown, Jamaica, at an elevation of 2000 feet; but has raged with great severity on the plateau of Caracas, 3000 feet above the sea, and at Cuzco, at an elevation of 11,000 feet.

The African race is far less susceptible to yellow fever than any other, and the fair nations of the white race most so. The aboriginal race of America and Mongolians are susceptible in rather less degree than the white race.

It has long been believed by residents of towns where yellow fever habitually prevails that natives of those places enjoy immunity from the disease. This notion was generally entertained by the creoles of New Orleans, and was termed creole immunity. Even Prof. S. H. Dickson, writing in 1855, expresses the same belief in regard to the natives of Charleston, S. C. As the fever has become less and less prevalent in these and other American cities, the idea has been gradually abandoned. In the most recent epidemics, which occurred after intervals of almost total absence of the disease for years, it has been found that young native children die in large numbers with the symptoms shown by others born at a distance. The explanation is, that children have the fever in infancy, where it prevails annually, and it is well known that nursing infants have great advantage over older subjects. This is attributable to the perfect quietude of their early existence.

A very prevalent and persistent belief, entertained in those cities most often afflicted with yellow fever, is that of its endemicity. There are physicians in New Orleans who still adhere to it, though all recent and undisputed appearances of the disease are unmistakably traceable to importation from its permanent seats. Yet there have been repeated instances of reappearance the following season after a general epidemic without fresh importation, of which the year 1879 afforded notable examples at Memphis and New Orleans. La Roche, writing in 1855, with special reference to Philadelphia, is unequivocal in denying the portability and communicability of yellow fever, and in insisting upon its originating in local causes, such as bad sanitary conditions connected with defects of drainage and accumulations of filth, together with some ill-defined and mysterious conditions of atmospheric humidity, electricity, and ozone. But it has not been explained in what respect these conditions have changed at Philadelphia and New Orleans, so as to occasion total absence at the former place, and its appearance at the latter, only when imported from abroad. Neither has it been explained what local conditions obtain around the shores of the Gulf of Mexico different from those existing upon the shores of the Indian Ocean, which can account for the continual presence of yellow fever on the one, and its total absence on the other.

One meteorological condition is universally acknowledged to govern the existence of the fever, and this is the only one supported by evidence of any value. A continued temperature of not less than 80° Fahr. must have been maintained for a considerable time, to give the disease activity enough to spread. It is invariably checked by frost, and repeated frosts put a stop to the malady. But in every inhabited place where the temperature never falls below 20°, there are sheltered spots in which water does not freeze, and here the *materies morbi* may survive the winter.

There have been able advocates of the theory that yellow fever is of the same nature as malarial fever, differing only in degree or virulence. This opinion is based solely upon similarity of symptoms, without regard to the following discrepancies: yellow fever prevails especially in towns, malarial fever in the country; the one is abruptly checked by frost, the other is not; the one spreads from a focus of infection and becomes epidemic, while the other is endemic; a single attack confers immunity with the one, and predisposes to repeated attacks with the other; the one is a fever of a single paroxysm and rather definite duration, while the other has a tendency to repeated paroxysms and indefinite duration; quinine has no control over yellow fever and almost absolute control over malarial fever.

Since 1820 the extent of country ravaged by this disease has much diminished. In 1822 strict quarantine regulations were instituted in Spain and at the ports of New York, Philadelphia, and Baltimore, and from that time it has ceased to be epidemic in Europe and ports of the Union north of Norfolk. In 1761 it became domiciled at Havana, persisting continually to the present time, and most of the towns on the island of Cuba are permanently infected. Since 1849 it has constantly occupied Rio de Janeiro and frequently occurred at the other cities on the Brazilian coast. For many years it has not been absent from Vera Cruz, though clean bills of health are generally granted there in the winter season. Since 1865 it has been permanently fixed on the isthmus both at Panama and Colon. These important seaports are visited by strangers at all seasons, and they always afford the three indispensable conditions for the existence of yellow fever—a high temperature, the active cause of the disease, and susceptible people to take it. At all the important ports of the eastern coast of the United States quarantine regulations are in force, of such efficiency as to give protection under ordinary circumstances. The epidemic of 1878 at New Orleans, which spread more extensively over the great valley than any previous visitation, has been followed by measures of exclusion more rigorously enforced than any previously adopted, and these have been so thoroughly seconded by local sanitation on the appearance of the disease that no spread has followed the landing of single cases, which have several times occurred on vessels after leaving the quarantine station.

While the preponderance of evidence indicates that yellow fever is a specific disease, due to a peculiar poison; that this poison is transportable in porous articles; that it spreads from foci in all directions upon land, without regard to air-currents, but is arrested by high and unbroken walls; that the poison is indefinitely multiplied in a temperature from 100° down to 60°, when once fairly grounded; yet, unlike most spreading diseases, its contagium seems to propagate itself rather outside the human body than in the persons of the sick.

Experience shows that ships and their cargoes, and the personal effects of crews and passengers, coming from infected ports, are more dangerous than sick persons landed without other effects than the clothing on their bodies.

The period of incubation is rather indefinite, varying from one to five days, though a longer limit is allowed by some. The attack is abrupt, and oftener at night than by day. It is ushered in with violent pain in the forehead and back, generally with a moderate chill, followed by a high fever, flushed face, and injected eyes. Nausea and vomiting frequently appear early and become persistent. Restlessness and insomnia are marked features. The gums are red, tumid, and bleed on pressure. The eyes, at first glistening and fiery red, afterward become jaundiced. In ordinary cases the fever rapidly declines at the end of the third day (sometimes earlier), when the pain and restlessness also disappear. The patient passes into a stage of calm, with great muscular prostration; but, with good management, makes a rapid and complete recovery, often being able to rise from bed in a week. In other cases more profound symptoms then set in. The temperature rapidly rises higher than before; the previously moist skin becomes dry and pungent; the urine is albuminous, scanty, and often completely suppressed; the stomach will retain nothing; the respiration is sighing; eructations of gas are frequent, followed by mucus, soon colored with small dark specks, which afterward give place to copious vomiting without effort of a fluid loaded with a black deposit like coffee-grounds ("black-vomit"), which is blood, colored by the acids of the stomach. The pulse, full and soft from the beginning, now becomes gaseous and flickering, the intellect is rather dulled than distorted, the flush of the face deepens, and gives way to a lemon hue, and death takes place by exhaustion, usually on the fifth day. If recovery takes place after these severer symptoms, convalescence is tardy and apt to be complicated with abscesses.

Yellow fever is a specific and self-limited disease, and it is worse than useless to attempt to interrupt or control its natural course by drugs, as is done in many other disorders. Heavy prescribers generally lose most patients. At the onset it is important to evacuate the bowels, and also the stomach, if it contains undigested food. Drinks should be given frequently, but in moderation. The body should be sufficiently covered to produce steady perspiration; and when this is interrupted, warm foot-baths should be given to the patient in bed, from which he should not be allowed to rise from the horizontal posture for at least five days. During the three days of fever, it is important to allow no food—certainly no solid food. For several days afterward nourishment of the lightest character, and entirely fluid, should be given in small quantities, and at short intervals. During this period, the judicious use of alcoholic drinks, in some acceptable form, is of the highest advantage.

Ordinary cases actually require no medication after the purgative dose—the emetic being used only when the stomach contains undigested food. A faithful, attentive, and skilled nurse is of the highest importance. The more severe symptoms require treatment adapted to each individual case, according to discretion, which can be acquired best by personal experience.

The mortality is largest with those lately arrived in the stricken locality; with the intemperate, particularly if seized during a spell of indulgence; with those who fear the disease; with those who continue to go about while sick (walking cases all die); with the headstrong, who will not submit to restraint, nor follow directions; with those who are disturbed through rashness or officiousness of those around them; with those who are unstintingly physicked and injudiciously fed. On the other hand patients have been starved to death through excess of caution.

The mortality in yellow fever varies from 5 to 80 per cent., being highest in sporadic and early cases, since success in treatment demands early recognition and appropriate management from the start. At New Orleans, the mortality in the epidemic of 1867 was about 8 per cent. of all cases; in that of 1878, nearly 20 per cent.

Various prophylactic remedies have been recommended and used, among which quinine was the most prominent in 1878, but no one proved trustworthy. The recent claims of Freire and Carmona, in the subcutaneous injection of the attenuated virus of yellow fever, by which they profess to produce a mitigated type of the disease, which confers subsequent immunity, lack confirmation. Analogy favors the hypothesis that this virus is a special microbe, but most searchers acknowledge their failure to differentiate from the variety found in the blood and excreta a species constant and peculiar to yellow fever.

3. *Dengue.*—This disease, also known as "dandy fever," "breakbone fever," "scarlatina rheumatica," and "eruptive rheumatic fever," is said by Pozzio to have been brought to Spain from Africa in 1764. A disorder resembling it, in respect of general prevalence with uniform recovery, is recorded to have occurred on the Coromandel coast of India in 1780. The first authentic accounts of dengue are dated 1824, when it appeared at Rangoon, Mecca, and the island of St. Thomas. This visitation was traced from India to Aden, and thence to Zanzibar. The disease probably originated in Africa. Dengue reached Charleston, Savannah, and other Southern cities in 1828, and again appeared in 1848. Since the latter date it has been a frequent visitant of the Southern States of the Union.

Though it is generally agreed that dengue is both specific and infectious, its course and symptoms are more variable than those of other diseases of this class. It is essentially epidemic in character, resembling influenza in the very large numbers attacked, in rareness of fatality, in liability to secondary attacks, and in its catarrhal symptoms. The onset is usually abrupt, but sometimes preceded by a few days of malaise. A brief chill is followed by a fever, sometimes rising to 105° of body-temperature. The most characteristic symptom is the severe and general pain, which is often so intolerable as to demand free use of opiates. In the febrile movement, injection of eyes, flush of face, restlessness, pain in head and back, and moderate hemorrhagic tendency of the nose, stomach, and uterus, there is strong resemblance to yellow fever; but an attack of neither one affords protection against the other, while yellow fever has never appeared in Asia or Eastern Africa. In most cases, but not uniformly, an eruption resembling that of scarlatina, sometimes that of measles or nettle-rash, appears in the early stage. The fever is subject to remissions, and during its course the eruption disappears, and may reappear in the same or a different form. After complete subsidence of the fever, at the end of five or six days it often reappears, but runs a shorter course. The whole duration of the febrile and eruptive stages varies from three to eight days, leaving the subject greatly prostrated. Convalescence is peculiarly slow, and the rheumatic symptoms are often prolonged.

Most cases demand relief to the pain and restlessness, for which opiates, the bromides, and chloral hydrate generally suffice. Abortive and depletive measures during the acute stage are worse than useless. Want of autopsies in this remarkable malady has prevented accurate knowledge of its lesions, and the bacteriologists have not assigned its peculiar microbe. (S. S. H.)

FEVER-BUSH is a common name of *Lindera Benzoin*, also called spice-bush and American Benjamin tree. It is of the natural order *Lauraceæ*, and was described under the name of *Benzoin odoriferum* by Nees. The flowers are bi-sexual and the four-parted calyx has permanent segments. The true Benzoin is a species of styrax, and the present species derives its name apparently from a mistake of Banister, who sent it from Virginia to Compton, Bishop of London, as a citron- or lemon-scented species of Benzoin. It has no relation to *Styracaceæ*, and is not even a gum-producing plant. John Clayton, the Virginian botanist, who furnished to Gronovius material for the *Flora Virginica* (1739), says, "It is a Virginian shrub, with the leaves of a persimmon, and berries redolent of benzoin. It is our wild allspice and wild pimento, famous for easing the soreness from colic pains." Rafinesque extends its beneficial uses to dysentery. As a febrifuge it has, however, derived its common name, yet it does not appear to have any more value than most aromatic herbs would have. Dr. Wm. Darlington, an eminent physician as well as botanist, makes no mention at all of it in connection with human diseases, but simply says that it is "a strongly aromatic shrub, of the twigs of which a decoction was formerly in great vogue as a medicinal drink for horned cattle in the spring of the year." The name Benzoin or Benjamin is of Malayan origin. The Cistercian monks dedicated the benzoin to St. Benjamin, a Persian martyr who died in 424, and whose festival is kept on March 31. This is about the flowering time of the American plant in the centre of its geographical area, which is in the low grounds of the Atlantic slope of the United States. The flowers are associated by the poet ornithologist Wilson with the arrival of the blue bird. The small, green flowers, on the bush of 10–12 feet, are succeeded in autumn by brilliant scarlet berries, and the bush itself is in some request as an ornamental plant for gardens. In this connection its only common name is spice-bush. (T. M.)

FIBRE. The main substances used as textile fibres, as is well known, are the wool of the sheep and the silk of the silk worm, of animal origin; and cotton, flax, and hemp, of vegetable origin. The hairs of some varieties of the goat, of the camel, and of some other animals, are also used in a lesser degree, while many plants yield fibres which are or may hereafter become important. Of these fibre-yielding plants about a dozen varieties which may yet be utilized are indigenous to North America. Of these the most important are *Abutilon* (Indian mallow or American jute), *Althea hibicus* (marsh mallow), *Yucca* (bear or dagger grass), and *Asclepia* (wild cotton, so called). To these may be added the introduced *Ramie* (China grass). In addition to flax, hemp, and cotton, these are our most important fibre plants. *Abutilon avicenna* is an annoying weed, which is frequently seen in corn and potato fields. It averages six feet in height, its fibre running the whole length of the bark, and being far superior to Indian jute in strength and dyeing qualities. It may be useful for fine cordage, carpet filling, matting, etc. *Althea hibicus* is a similar, marsh-growing plant, of five feet in height, and yielding an excellent fibre. It is really a cotton plant without fruit, while the cotton plant itself possesses a good fibre in its bark, which has never been utilized. Steps towards its utilization are now being taken. *Yucca* belongs to the semi-tropical agave tribe, yet it resists Northern winters, and is grown from Pennsylvania to Florida. It has a large percentage of fibre, which resembles Manilla in strength and quality, but not in length, and is suitable for cordage. *Asclepia* yields a pod whose seeds are furnished with a silky cotton-like hair over 1½ inches long, while the bark has a soft white fibre, of some value. The silky hairs are coated with so much silica that they could not be used without some silica-dissolving treatment. *Ramie* is of growing value as a fibre plant. It is well suited to our climate from New Jersey to the South, and is the most prolific of textile plants. Rooted in fair sandy soil its shoots increase at the rate of 100 annually for each one planted. The stalks measure 4 to 5 feet in length, and yield a fibre with the fineness, gloss, and almost the tensility of silk. It has been used in the East since before the Christian era. Its preparation is very difficult, needing a combination of chemistry and machinery, yet the American method of treating it is complete and radical, and its use is extending in this country. The ordinary textile plants, hemp, flax, and cotton, have been treated under their respective titles, yet the experiments made by Professor J. M. Ordway on cotton fibre, in connection with the 1880 census, call for some attention. The hair of the cotton seed is, when young, a cylinder filled with liquid. In ripening this disappears, and the cylinder contracts into a flat band, with thickened edges, and more or less of a spiral twist. To this peculiarity much of the value of cotton fibre is due, since it permits it to be easily spun even when very short. Its value in this respect depends upon the extent of the twist, the width, and the form of the edges. Cotton varies considerably in length, ranging ordinarily, according to Professor Ordway's measurements, from ¾ to 1½ inch, while the Sea Island staple ranges from 1⅔ to 2 inches. The width averages about .001 inch. The breaking weight of the fibre varies from 61 grains for sandy upland growth to 214½ grains for the product of creek bottoms. The percentage of list on the seeds varies from 31.67 to 43.79. *Short staple* cotton signifies that which is under .98 inch in length; *medium*, from .98 to 1.17; *long*, from 1.18 to 1.57; and *extra*, 1.58 and over. The long and extra staples appear to come from what Todara describes as *Gossypium maratimum* (Sea Island cotton). The short and medium correspond to *G. hirsutum* and *G. herbaceum*. Of the cotton-raising States Florida makes the best show as to quality, Sea Island cotton being predominantly grown. The fibre product of the United States in 1880, per the census reports, was: flax, 1,565,546 lbs.; cotton, 5,755,359 bales; and hemp, 5,025 tons. (C. M.)

See Vol. IX. p. 115 Am. ed. (p. 131 Edin. ed.).

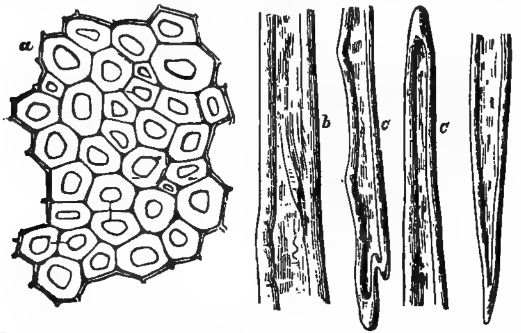


FIG. 1.—Fibres of Yucca (*Agave Americana*) magnified 275 times.
a. Sections of the fibre. *b*. Longitudinal views. *c*. Ends.

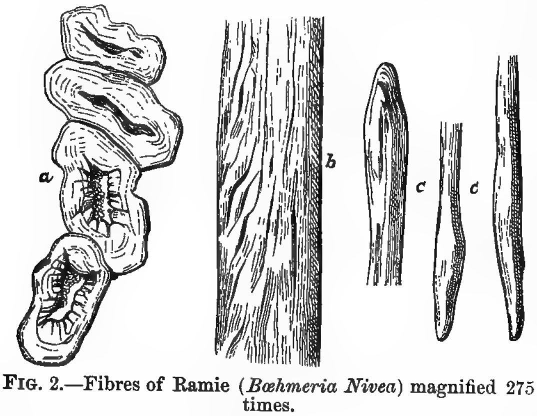


FIG. 2.—Fibres of Ramie (*Bœhmeria Nivea*) magnified 275 times.

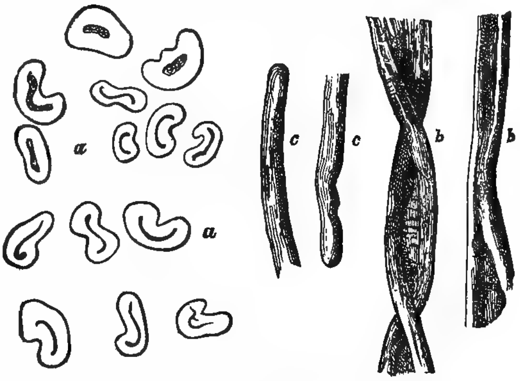


FIG. 3.—Fibres of Cotton (*Gossypium*) magnified 275 times.

FICHTE, IMMANUEL HERMANN (1797–1879), a German philosopher, son of the famous J. G. Fichte, was born at Jena, July 18, 1797. He studied philology at the University of Berlin, and early devoted himself to philosophy. In 1822 he began to teach at Saarbrücken, and he was afterwards director of the gymnasium at Düsseldorf. In 1836 he was called to the University of Bonn as professor extraordinary, and in 1840 was made ordinary professor. From 1842 to 1867 he held a similar position at Tübingen. He died at Stuttgart, Aug. 8, 1879. His first publication was *Sätze der Vorschule zur Theologie* (1826), and his first important work *Beiträge zur Characteristik der neuern Philosophie* (1829). He then published his father's *Life and Literary Letters* (Sulzbach, 1831), and at a later date edited his father's *Complete Works* (8 vols., Berlin, 1845–46). He also established at Tübingen, in 1837, the *Zeitschrift für Philosophie und Speculative Theologie*, which he edited until 1848. In 1852 it was revived by Fichte, Ulrici, and Wirth. His other publications comprise *Ueber Gegensatz, Wendepunkt und Ziel heutiger Philosophie* (3 vols., Heidelberg, 1832–36); *Speculative Theologie* (Heidelberg, 1847); *System der Ethik* (1850–53), which is his most important work; *Anthropologie* (2d ed., 1860); *Psychologie* (1864); *Philosophie, Theologie, und Ethik* (2 vols., 1869); *Die theistische Weltanschauung und ihre Berechtigung* (1873). His system was a continuation of his father's in the direction of Christian theism, of which he was for a time the most prominent champion.

FIELD. The name of an American family, noted in mercantile, professional, and public life.

I. **Field, David Dudley** (1781–1867), an American clergyman, was born at East Guilford, Conn., May 20, 1781. He graduated at Yale College in 1802, studied theology under Rev. Dr. Backus, and was installed pastor at East Haddam in 1804. Here he remained until 1818, and in 1819 he accepted a call to Stockbridge, Mass., but in 1837 he returned to Haddam. In 1848 he travelled in Europe, and in 1851 he resigned his charge. He spent the remainder of his life at Stockbridge, where he died April 15, 1867. He published some works of local history and occasional sermons.

II. **Field, David Dudley**, an American jurist, eldest son of the preceding, was born at Haddam, Conn., Feb. 13, 1805. He graduated at Williams College in 1825, studied law, and was admitted to the bar in 1828. He settled in New York city, and became one of the leaders of the bar. In 1839 he began his advocacy of reform in the modes of legal procedure, and as a result of his efforts the revised State constitution of 1846 provided for the codification of the laws. In 1847 he was appointed by the legislature a member of the commission to carry out this provision. For the reforms effected by this commission see Code, Vol. II., p. 280. In 1857 Mr. Field was called by the legislature to continue and supplement his former work by preparing other codes, civil, penal, and political. These were completed in 1865 and 1866, and the penal code was finally enacted in 1882. In 1866 he induced the British Association for the Advancement of Science, at its meeting in Manchester, to appoint a committee of eminent jurists to revise and codify international law. In this case even more than in the former the chief labor fell upon himself. By 1873 he had prepared a large volume, called *Outlines of an International Code.* It was approved by a meeting of the most eminent European jurists held at Brussels in that year, and an association was there formed to advocate the decision of international disputes by arbitration, and to promote in each country the codification of the laws. Mr. Field has taken an active part in the discussion of the questions of the day, and has published several political pamphlets.

III. **Field, Cyrus West**, an American merchant, son of Rev. D. D. Field, D.D., was born at Stockbridge, Mass., Nov. 30, 1819. At the age of fifteen he went to New York, where he entered upon a mercantile career. In 1853 he spent six months in travelling in South America. On his return he was asked to assist in establishing a telegraph across Newfoundland. Being convinced that it would be practicable to lay a line across the ocean, he obtained from the legislature of Newfoundland the exclusive right for fifty years to connect that island by telegraph both with Europe and the continent of America. He then organized the New York, Newfoundland, and London Telegraph Company to carry out this plan. Two years were spent in building the necessary land lines, and the submarine cable was laid across the Gulf of St. Lawrence in 1856. Mr. Field then went to London, when he organized the Atlantic Telegraph Company to lay the cable across the ocean. Two attempts to lay the cable proved unsuccessful, and in August, 1858, when communication was at last established, the cable worked only a few days. Most of those who had been interested in the work became disheartened, but Mr. Field preserved his faith and made fresh efforts. The breaking out of war in America prevented anything from being done until 1865. In the meantime the art of telegraphy and all its appliances had been improved. The Great Eastern was employed to carry the cable across, and though unsuccessful in its first voyage in 1865, it accomplished the work in the next year, and even recovered the cable which had been lost the year before. A double line was thus obtained, and since that time communication has never been interrupted. Mr. Field was now the recipient of many marks of honor; Congress voted to him a gold medal with the thanks of the nation; the Paris Exposition of 1867 bestowed on him its highest prize, and the British Government testified its appreciation of his skill, courage, and perseverance. Mr. Field continued to devote attention to the improvement of the practical working of the ocean telegraph, and afterwards he used his time and wealth in the establishment of elevated railroads and other devices for the benefit of New York city.

IV. **Field, Stephen Johnson**, an American jurist, was born at Haddam, Conn., Nov. 4, 1816. He was the son of Rev. D. D. Field, D. D., and when only thirteen years old went to Smyrna and Athens, where he spent three years. He graduated at Williams College in 1837, studied law with his brother Dudley in New York, and became his partner. In 1848 he went to Europe and in the next year to California, where he settled at Marysville, and was elected alcalde, an office which then involved much care and responsibility. In 1851 he was a member of the first State legislature, and successfully exerted himself to establish satisfactory laws in regard to miners' claims and customs. In 1857 he was elected a judge of the Supreme Court of California, and in September, 1859, he became the chief justice of the State. His success in adjusting conflicting claims under Spanish and English laws was so great that, when these troublesome questions were brought by appeal before the Supreme Court of the United States, Pres. Lincoln in March, 1863, appointed Judge Field, though a Democrat, an associate justice of that court. He delivered dissenting opinions in several important cases relating to the powers of the national government.

V. **Field, Henry Martyn**, an American clergyman, son of Rev. D. D. Field, D. D., was born at Stockbridge, Mass., April 3, 1822. He graduated at Williams College in 1838, studied theology at East Windsor, Conn., and New Haven, and was pastor of a Presbyterian church in St. Louis from 1842 to 1847. He then spent a year in travelling through Europe, which furnished him material for a history of the Italian revolutions and other publications. In January, 1851, he was installed pastor at Springfield, Mass., but in 1854 he removed to New York to become editor of the *New York Evangelist*, of which he afterwards became proprietor. He has since spent much time in foreign travel, and in 1875–76 made a journey around the world. Among his publications are *Irish Confederates* and *The Rebellion of* 1798 (1851); *History of the Atlantic Telegraph* (1866). His books of travel include *From the Lake of Killarney to the Golden Horn* (1877); *From Egypt to Japan* (1879); *On the Desert* (1882); *Among the Holy Hills* (1883); and *Turkey and the Greek Isles* (1885).

FIELD, Kate, an American journalist, was born at St. Louis. After receiving a careful education in Massachusetts and Europe she became foreign correspondent of leading American papers. She also contributed to the *Atlantic Monthly* and other periodicals. In 1874 she appeared on the stage in New York, but she has had more success as a lecturer. In 1883 she undertook the management of a Co-operative Dress Association in New York, but it failed within a year. She is a brilliant writer and an able dramatic critic.

FIELD MOUSE, the common name given to many species of small rodents of the family *Muridæ*, but more properly restricted to the members of the genus *Arvicola*. This genus includes about 50 species, of which 27 are North American. The field mice or voles probably far exceed in number of individuals any other mammal, and sometimes appear in such vast hosts as to be terribly destructive. In a single province in Germany 1,500,000 of them were captured in 14 days, in 1822. They frequent fields and woods, and have often destroyed extensive young plantations by gnawing the bark from trees, while their ravages on grain fields are often very severe. It is their habit to lay up a winter stock of food in their underground runs, and a vast quantity of nuts, grain seeds, and roots is sometimes thus accumulated. The field mice are spread all over the northern portion of the north temperate zone, where they seem to prefer the colder regions, while the true mice prefer the warmer. The most common of the United States species are the generally distributed red-backed mouse, the meadow mouse of the Northern and Middle States, and the gray and upland mice of the Eastern States. The meadow mouse (*A. xanthognatha*) is about 5 inches long, with fawn-colored back and ashy gray beneath. Another species, perhaps a variety of the above, the Pennsylvania meadow mouse (*A. Pennsylvanica*), is 4 inches long, tail ¾ inch, of brownish fawn color above and grayish white below. It has very small eyes and short ears. It feeds on bulbous roots, and often injures river plantations by making holes in the banks. The genus *Arvicola* includes our common water rats, and several other excavating rat-like species. There are many species of other genera with habits similar to the field mice, the smallest being the harvest mouse (*Reithrodon humilis*), which is but 2¼ inches long, and closely resembles a small house mouse.

Field Mice and Nest.

FIELDS, **James Thomas** (1817–1881), an American publisher and author, was born at Portsmouth, N. H., Dec. 31, 1817. At the age of 14 he found employment in a bookstore in Boston; and from 1837 to 1870 he was a member of a publishing firm. Thenceforth he devoted his time to lecturing and authorship. While a publisher, Mr. Fields had edited several valuable works, and he was editor of the *Atlantic Monthly* from 1861 to 1871. Volumes of his poems appeared in 1849, in 1854, and in 1858. He also wrote *Yesterdays with Authors* (1871); *Underbrush* (1877). He died in Boston, April 24, 1881.

FIGUIER, **Guillaume Louis**, a French scientific writer, was born at Montpellier, Feb. 15, 1819. Having studied chemistry in that city, he received, in 1841, the degree of M. D. In 1846 he was made professor of pharmacy at Montpellier, and he was afterwards connected with the school of pharmacy at Paris. He contributed a vast number of scientific articles to various periodicals. Among his more important works are *Exposition et histoire des principales découvertes scientifiques modernes* (1851); *L'Alchimie et les alchimistes* (1854); *Histoire du merveilleux dans les temps modernes* (1859–60). He has also published popular presentations of science and natural history which have been translated into English. Among these are *The Vegetable World; The Ocean World; The Insect World; The Wonders of Science; The Wonders of Industry.* In 1856 he founded *L'Annee scientifique et industrielle*, which he has since continued to edit with success.

FINANCE, **American.**—Finance relates to the modes of raising and expending public revenue. It is true that bankers are not infrequently called financiers, but such a use of the term is an abuse of language. A banker is a dealer in money; a financier is an administrator of the public revenue, and this distinction should always be regarded. As the Encyclopædia Britannica under this head treats the history of British finance, we shall here describe the modes of raising and expending the public revenue in the United States.

I. The subject may be conveniently divided into five periods; the first is the *Colonial*. Beginning with the oldest colony, Virginia, four sources of revenue may be mentioned. First, were the quit-rents, which were paid to the king; second, an export duty on tobacco and port duties on vessels arriving; third, a duty on tobacco exported to other colonies, which was paid to William and Mary College; and last, the money-tax raised by the assembly. There were also three levies: the parish levy which was assessed by the vestries; the county levies which the justices of the peace assessed; and the levy assessed by the assembly. All three were paid in tobacco, which formed the money of the colony, and were collected by the sheriff. They were assessed on the whole number of persons in the parish, county, or colony, and divided by the number of taxable persons. The governors of the colony often quarrelled with the assembly about the taxes, but the latter easily had their way unless the royal government interfered. As the expenditures, except in time of war, were small, the taxes were light and easily borne. No army or navy existed. The governor received a salary which was a charge on the export duties, and another sum was distributed among the councillors. The expenses for clerks, courts, etc., were light, and so were all salaries.

As Maryland was a proprietary government, the proprietary held the title to the land, and controlled all the patronage, both lay and clerical. To him belonged the quit-rents, the tobacco and tonnage duties, and the legal fines and forfeitures. The legislative body consisted of the council and the burgesses; the former were appointed by the governor, who represented the proprietary, while the latter were elected by the people. Before the Revolution the burgesses had succeeded in wringing from the proprietary the entire law-making power, and limited the exercise of his patronage by regulating the fees. The government was inexpensive, and consequently taxation was light. Quit-rents and church-dues were the only matters of complaint. The original charter contained exemptions from taxation, but in 1661 a revenue was raised for the crown by customs duties.

In North Carolina revenue was raised for the crown from "quit-rents, tonnage duties, and duties on rum and wine; while the expenses of the province were met by simple and direct taxation of tolls, tithables, free negroes and their intermarriage, and by an excise on spirits. There were, as in Virginia, public, county, and parish levies, collected by the sheriffs. Taxation was light; but it was sedulously avoided by the people, who were clearly of opinion that all taxes were an evil, and was only enforced with the greatest difficulty; so much so that the government found it necessary to get a portion of its revenue by compelling the inhabitants to work on the roads and keep the streets of the towns clean." In South Carolina revenue was raised chiefly from general duties on all things except British manufactures, and on deer-skins when exported. A direct real and personal tax was laid. The quit-rents, when collected, were paid to the crown, and so were the duties on negroes and liquors imported. The salaries and ordinary expenses of government were light, and taxation was not a burden. The assembly of that colony, like most of the others, held the purse-strings and possessed the patronage of the financial offices. In Georgia, also, taxation was light; the quit-rents were paid to the crown, and the revenues needed to pay the few and small salaries and other expenditures were raised on rum, negroes, and West India produce, supplemented by a small direct tax on lands, houses, and slaves.

The colonies of Pennsylvania and Delaware will be described together, as a single executive administered the affairs of both. With the exception of Maryland, they were the only proprietary governments among the thirteen. "The descendants of William Penn stood in a relation of quasi sovereignty, and drew a large revenue from the great colony which bore their name." The income to the proprietary came from the quit-rents reserved in all deeds, and which could be collected by distress, and from manor-lands. The taxation of these caused much contention. Other revenue was raised by direct taxes, excise, light customs, and tonnage duties. The latter were spent for the erection and maintenance of light-houses. No navy existed, and the small militia was organized and maintained without expense to the public. As the salaries were neither numerous nor heavy, it was not necessary to go far into the pockets of the people to maintain the government. Across the Delaware was New Jersey, whose government was so frugal that only a small revenue was needed, which was raised chiefly by taxing the land. When we reach the colony of New York the story is changed. The government was often ill-managed and expensive and sometimes corrupt; beside, the frontiers were greatly exposed to Indian attacks, and constant expenditures were needful to maintain a successful defence. Consequently, taxes were much higher than in the other colonies and were raised by duties on negroes and other importations, and by direct levies on real and personal estate. The method of levying them was unjust and oppressive, and caused no little irritation.

Although the forms of government in the New England colonies differed somewhat from each other, their points of resemblance were more numerous, and also their methods of administration. "The theory of taxation," says Lodge, "was simple and democratic—to levy on all property without distinction; and although a system suited to the condition of a colony has long been outgrown, it still prevails not only in New England, but in many parts of the United States, a monument of Puritan policy and of conservatism of thought and habit." Of course, in the long colonial period of more than 150 years, many changes occurred in the financial systems of the colonies which have not been mentioned. Only a few of the more general and permanent features have been sketched. The historian of New England, Dr. J. G. Palfrey, thus describes the revenue system of the Massachusetts colony after it had existed forty years. "The public charges continued to be met by a revenue chiefly derived from direct taxes upon property. Real estate and stock in trade were assessed according to an estimate of the value made by town magistrates. Cattle, sheep, goats, and swine were taxed according to a permanent legal valuation of each description of such property. Artisans and mechanics contributed to the public expenses in proportion to the estimated gains of their business. There was a capitation tax of 1*s.* 8*d.* for each male person 'from sixteen years old and upwards.' Assessments were made in the autumn of each year, but selectmen might in any month collect taxes from transient merchant strangers on property brought by them into the country. Ministers of religion were freed from all rates for the country, county, and church, so far as concerned such estate as was their own proper estate, and under their own custody and improvement. 'Taverners paid a duty for the wine which they sold, at the rate of 50*s.* by the butt or pipe, and proportionally for all other vessels;' and for the retail of 'strong waters,' at the rate of '2*d.* upon every quart.' Imported goods of all descriptions, 'excepting fish, sheep's wool, cotton wool, salt,' and a few others, had to pay an *ad valorem* duty of 5 per cent. on a valuation determined by adding 5 per cent. to the cost of the article at the place of exportation." In the Plymouth colony a premium was exacted for the privilege of taking bass and herrings with nets on the coast of Cape Cod, while the other colonies introduced some changes into the system above described, required by their different situation. With respect to their expenditures these were quite similar to the expenditures of the colonies outside New England. Those for the ordinary administration of the governments were light, and hence the amount of revenue required was small.

In all the colonies, however, additional expenditures were necessary for extraordinary purposes, such as resisting Indian aggressions, and especially for the French war. The outfit of the Massachusetts troops for the Port Royal expedition had been accomplished by borrowing money with the expectation of getting enough from the enemy to repay the lenders. When the expedition returned without achieving success, the government knew not what to do. The colonial treasurer had no money, the soldiers needed their pay and were near the edge of mutiny. A heavy tax was laid, but funds were necessary at once. The General Court, in 1690, "desirous to prove themselves just and honest," so they said, considering the "scarcity of money and the want of an adequate measure of commerce," authorized a committee to issue forthwith in the name of the colony £7000 in bills of credit, from 2*s.* to £5 each. They were essentially the same as the treasury notes issued at a later day, and were payable by a tax and also receivable for public dues. They fell in value as soon as issued, so that the soldiers who received them were losers. When the outcry was loudest the governor did something to lessen it by exchanging a considerable amount of specie for the notes. Two years afterwards their value was enhanced by the issuing of an order which declared that they should pass current within the colony in all payments at their face value, and in all public payments at 5 per cent. advance. The object of this action was to prevent their depreciation, and for 20 years it was effectual. When taxes became due they were worth more than specie because the 5 per cent. bonus was attached to them. When £40,000 had been emitted an order was passed limiting the amount to those figures, but the cry of the "scarcity of money" was constantly heard, and within 12 years, including re-emissions, £110,000 were issued. This increase, however, finally affected the prosperity of the colony. "During the first half of the eighteenth century," says Palfrey, "the prosperity of Massachusetts was kept down by her use of a vicious substitute for money. The paper-money drove almost all the coin abroad, leaving commerce without a sound currency whereon to base its transactions." The success of the colonies in dealing with so hazardous a thing greatly varied. Connecticut, after the disastrous attempt on Canada in 1709, issued paper-money to the amount of £8000. Four years afterward the issue of £20,000 more was ordered, but only a part of the amount was annually put in circulation, and the provisions for redeeming it were so judicious and well enforced that for many years no depreciation occurred. Indeed, it never became large. South Carolina, perhaps, carried the paper-money experiment further than any other colony. After the unsuccessful expedition against St. Augustine in 1703, "following the example of many great and rich countries, who have helped themselves in their exigencies with funds of credit, which have fully answered the ends of money," £6000 were issued bearing 12 per cent. interest. They were a legal tender, and if the creditor refused to receive them he lost his debt. "But such refusal never occurred, for the paper was hoarded for the sake of the interest." Afterward another issue was made which did not bear interest, and was exchangeable for the "old currency." A twofold object existed for this issue: to increase the volume of circulation, and to diminish the interest burden. "Notwithstanding this change, the bills remained at par until the subsequent issue of very large amounts caused their depreciation." In 1712 the colony established a public bank, which issued £48,000, called bank-bills, which were lent on landed or personal security for a year. By this mode the people were furnished with a circulation, and the government profited by the interest received. Pennsylvania adopted a similar mode of issuing paper-money, and continued it with marked success for a long period. The act first, authorizing the modest sum of £15,000, was passed in 1723. The bills were to be lent on land security or plate of treble value, deposited with the government at 5 per cent. interest. They were declared to be a legal tender in payment of all debts, and if the creditor refused them the obligation to pay ceased. The lenders were to pay annually one-eighth of the sum borrowed and the interest. A loan office was created at which the business was conducted by 4 trustees. In December, 1723, the issue of £30,000 more was authorized, and 3 years afterward an additional sum of £10,000 to replace the bills which had become torn or defaced. The most serious evil which attended their circulation was the counterfeiting of them. Notwithstanding the severe laws against the practice, large quantities of fraudulent bills were put into circulation. They were made chiefly in Ireland, and brought into the colony. The colony having thus amply provided for their redemption, the notes circulated freely at their face value and superseded the bills of other colonies, which, until that time, had formed the chief part of the circulating medium. The only trouble which arose from this paper-currency was due to the action of the proprietaries, who demanded and received in payment of their quit-rents the difference of exchange on England, and an annuity of £130 annually so long as the notes circulated. For 40 years the system worked well; so well, indeed, that Gov. Pownall declared "that there never was a wiser nor better measure, never one better calculated to serve the interests of our increasing country." But in 1756, in consequence of the immediate need of a large supply of public funds, £60,000 were voted for the king's use, which was to be redeemed by taxation. Subsequently, other issues were put into circulation redeemable in the same manner.

Three modes, therefore, were practised by the colonies in issuing paper-money: 1. The issuing of bills which were redeemed by receiving them in payment of taxes; 2. The issue of bills in the way of loans to individuals who paid interest thereon, and which were cancelled when the lenders returned the same; and 3. The issuing of bills which bore interest. The mode first mentioned was the most extensively practised; New Jersey adopted it at the outset, and afterward adopted the second. All the colonies issued paper-money, but not many before 1700. In truth, Massachusetts was the pioneer. During the Revolution they issued large quantities, and it depreciated enormously, causing untold distress. In this connection mention must be made of the colonial coinage. The Massachusetts "mint-house" was established in Boston in 1651. The mint-master, John Hull, coined by contract, charging 5 per cent. The coins thus struck did not go beyond the New England colonies. The institution was declared to be illegal, yet it continued in operation for more than 30 years. To conceal its business all the coins were dated 1652. The other mint was established in Maryland, in 1660, and silver-money was struck 9 pence to the shilling. In 1662 "the people were ordered to buy 10 shillings per poll of this sophisticated coin, and pay for it in good casked tobacco at 2*s.* per pound." This arbitrary measure was repealed in 1676.

II. *The Revolutionary Period.*—After the colonies declared themselves independent, the most serious difficulty they encountered was to provide the funds needful to equip and sustain an army. Men were forthcoming, but where could the means be obtained to pay them? The colonies themselves were poor, for they had just emerged from an exhaustive war on the northern frontier. As we have seen they had relied largely on paper-money, but the credit of every colony had been stretched to the utmost, and in most of the colonies their bills were depreciated. The Continental Congress had no credit, for it possessed no well-defined powers. The delegates had been sent by the respective colonies clothed with certain powers which were defined in their letters of appointment. They were, therefore, in every sense the representatives of the colonies, and were obliged to look to the appointing and not to a central power for authority. What could such a body do in the way of raising money? Who would trust the Continental Congress? Suppose the contest should prove unsuccessful, who would pay the indebtedness incurred? Lenders have never been swift to part with their money under such circumstances. Moreover, the people were not a unit in opposing Great Britain. Many tories flourished who were as active as they dared be in aiding the enemy. To raise the money required was therefore a most difficult task, and, considering the nature of it, one cannot help wondering that the Continental Congress should have dared raise the flag of rebellion. The truth was repeated, alike in the lives of nations and individuals, no one measured the full cost of the undertaking. Had those delegates been able to see all the hardships that were to be endured, probably they would have shrunk from trying the great experiment.

The first resource was the issue of paper-money. But Congress dared not lay a tax to provide for its payment. That body had no power to do such a thing. At a subsequent period the States were recommended to lay taxes for raising money to support the general government, and apportionments were made among them, but this was the furthest limit in the way of exercising general authority. Whether, therefore, the issue of paper-money was expedient to adopt, let it be remembered that it was the only resource in the beginning. Congress could get some means in this manner; moreover, the expedient was popular. Taxation, however, would not have been endured in the beginning, nor, indeed, at any time. Said one of the delegates during a debate on this subject: "Do you think, gentlemen, that I will consent to load my constituents with taxes when we can send to our printer and get a wagon-load of money, one quire of which will pay for the whole?" Nor was this view shared by him alone. All the members knew that the colonies had issued paper-money in many cases without causing a depreciation in value, and why could not Congress do the same thing? This was the way the members reasoned. The first issue was for $2,000,000, and the second issue, which was authorized soon afterward, was for $1,000,000. The third issue for $3,000,000 soon appeared. Had no more been issued its value could have been easily sustained. But this was only a small portion of the revenue required. Within a year the bills began to depreciate. As soon as this was perceived some members who had favored the issue of paper-money urged Congress to try the experiment of borrowing. But there was no time to wait, and the printing-press was set agoing. Although independence had now been declared, Congress had no authority to tax, and therefore could raise no money by direct authority from the States. Congress did call on the States repeatedly to contribute, and apportionments were made on the basis of population. Of course this was a very weak way to get money, but what more could Congress do? Neither the amount of wealth nor the number of population was known. Congress, however, could guess more exactly concerning the latter than the former. From time to time addresses were issued to the States, urging them by the strongest arguments possible to contribute. If wrongs were done, they would be corrected in the end. New Hampshire made a census of her population, and, finding the number to be far below the estimate made by Congress, desired a reduction of the apportionment. The thoughtful reply was made that perhaps if the other States made an enumeration of their population it would appear that the estimates for them were equally high. So Congress refused to correct it. The States did contribute to some extent, but very fitfully and unequally. Congress continued to push out the paper-money into the fearfully swollen stream, and to sustain its sinking value by arguments addressed to the people showing its worth. On such matters the people of every country have always done their own thinking. The most remarkable of these addresses was issued in 1779. The amount issued had been enormous, and Congress proposed to stop when $200,000,000 had been put in circulation. Congress sought to show how small the debt would be, "perhaps not ten dollars" apiece; besides, as the debt would not be payable immediately, but probably twenty years allotted for it, the number of inhabitants by that time in America would be far more than double their present amount. Congress also added: "Let it be remembered that paper-money is the only kind of money which cannot make unto itself wings and fly away. It remains with us; it will not forsake us; it is always ready and at hand for the purpose of commerce or taxes, and every industrious man can find it." Many expedients were attempted to prevent it from sinking in value. One of these was the making of it a legal-tender so as to circulate as widely as possible. Another method was the fixing of the prices of the commodities usually bought and sold by law. This was the favorite remedy. The idea was not altogether new, for the colonies had established many regulations of that nature. The right to thus restrict the operations of trade seems not to have been questioned. When, therefore, prices had risen to a considerable height, representatives of the New England States assembled at Providence and formed a tariff, which was adopted by all the States represented in the convention. The plan was eagerly seized by Congress and recommended to other States for imitation, in order "to prevent the present fluctuating and exorbitant prices." A week before this action of Congress John Adams wrote to his wife that "the attempt of New England to regulate prices is extremely popular in Congress," but, "for my own part," he continues, "I expect only a partial and temporary relief from it, and I fear that after a time the evils will break out with greater violence. The matter will flow with greater rapidity for having been dammed up for a time," the truth of which opinion was soon seen. The rapid increase of prices was generally condemned as immoral and unpatriotic and deserving severe punishment. A French writer, who doubtless expressed the truth, wrote, "The country people are so exasperated at the high price everything bears that unless some change soon takes place they threaten not only to withhold provisions from the town, but to come down in a body and punish the leaders."

The depreciation was quickened by State issues of paper-money. As a considerable part of the cost of the war was maintained by the States they were obliged to raise funds. Of course they had the power to levy and collect taxes, but were slow in exercising this power. They preferred to rely on the paper-mill. These issues were in conflict with those issued by the Continental Congress and helped on the depreciation. Another cause which operated powerfully in the same manner was counterfeiting. The severest laws were enacted against counterfeiters, but without lessening the evil. The enemy engaged in the business. A ship laden with counterfeit money was lost during the voyage to our shore. These causes, and others which we have not space to mention, seriously affected the value of these issues and led many to fear that repudiation would be the end of the experiment. Congress, though, repelled this suspicion with lofty indignation, declaring that it was with great regret and reluctance they could prevail on themselves to take the least notice of a question which involved in it a doubt so injurious to the honor and dignity of America. "We should pay an ill compliment," they continued, "to the understanding and honor of every true American were we to adduce any arguments to show the baseness or bad policy of violating our national faith, or omitting to pursue the measures necessary to preserve it. A bankrupt, faithless republic would be a novelty in the political world, and appear among respectable nations like a common prostitute among chaste and respectable matrons." Yet this very thing did happen not long afterward. These issues continued to sink in value, and Congress finally acknowledged the depreciation. A scale of depreciation was established, but they continued to fall more and more in value until they disappeared from circulation. When this event happened, the government was better off than ever. The British government had applied the base arts of forgery to the utmost extent, confidently believing that if the paper-money fountain could be dried up, the rebellion would come to an end. Vain hope: having cast off this incubus, the government was in a better condition than before to continue the struggle. The truth is, the people had been paying for the money all through its course of depreciation. The tax was an enormous one, and occasioned much hardship and inequality. The debts of that period were paid in the depreciated paper-money, and many a pitiful story might be told of the losses to wards, schools, and the like through the operation of paper-money. The newspapers of that day contained letters written by the persons who had thus suffered through their guardians and trustees. Yet the end of the paper-money experiment was not quite come. Congress essayed another. It was for the States to make new bills which were to be countersigned by the general government. These were called bills of the new emission. Not many were issued, for the people had had enough of paper-money.

Besides paper-money Congress did borrow some money to carry on the war. Loan-offices were established in all the States, and the people were invited to lend. It was hoped that they would subscribe liberally enough to put an end to further issues of paper-money, and thus prevent its value from depreciating. The loan-office certificates issued were of two kinds. One kind bore interest payable in specie, and the other in paper-money. The former kind was the more popular. When the American commissioners in Europe gave assurance of their ability to borrow enough specie to pay interest on all sums which the government could probably borrow at home, and sustained their word by promptly paying all bills of exchange drawn on them for the discharge of such interest, the more patriotic citizens purchased a considerable quantity of certificates. In numerous instances property was sold and the sum received was invested in this manner.

When Congress authorized the certificates it was supposed they would be hoarded for the sake of the interest just as the interest-bearing bills of exchange had been. Unhappily they were not; their circulation became general, and they had essentially the same effect as the issue of an equal quantity of paper-money. Moreover, the very fact that they did bear interest led persons to take them in preference to continental paper-money, thus depreciating the value of the latter. Such an effect was not foreseen at the time their issue was authorized.

Beside a home loan of this nature money was borrowed from abroad. France disliked England and longed to witness her defeat and humiliation. The first money loaned to Congress was in secret, nor was this known for a long time. In 1778, after the surrender of Burgoyne, an alliance was formed with France and a loan was granted. It was from this source that a supply of specie was obtained for paying the interest on the specie-bearing loan-certificates. France continued to supply funds to some extent during the war, and became responsible for a loan contracted by John Adams with bankers in Holland. Toward the close of the war the Bank of North America was established, which also made loans to the government, while Robert Morris also used his own extensive personal credit in the same manner.

The machinery for administering the finances was crude in the extreme. A Board of Treasury was established in 1776, consisting of ten members of Congress, who employed such assistance as was needful for transacting the public business. As the members also had legislative duties it will be at once seen how inefficient their administration must have been. The mode of conducting the business was improved from time to time, but at best great dilatoriness was shown. Letters remained unanswered, and matters of pressing moment often received no attention. As the paper-money depreciated, and the unpaid requisitions increased, the affairs of the office became more disordered until Robert Morris was elected superintendent of finance, when the board was abolished. Morris insisted on having large powers, particularly with respect to the removal and appointment of men in his office. Several of the members of Congress objected to granting him such large powers, but he was inexorable. He knew that the inefficiency of the Treasury Board was due largely to divided responsibility. There was no head. There were two reasons why this state of things so long existed: the first was because Congress was afraid to bestow much authority on any one; they were afraid of power, and could not immediately forget how they had suffered from the exercise of it. The people had suffered too much from the exactions of the members of the British cabinet to put much authority in individuals, even if they were of their own number. The other reason was because no one had shown a marked aptitude for administering the finances. Morris had indeed displayed much patriotism, he had contributed generously to the needs of the government, and his influence had been potent in persuading others to do likewise. He was a man of large wealth, a successful merchant, and commanded the confidence of all. The time at length came in 1781 when Congress was willing to put the finances of the country in his hands. Morris was no believer in paper-money, nor in slipshod methods. He sought to reduce the public indebtedness to order, to find out the nature and amount of the unpaid requisitions, and to stop the practice which had been in operation for some time of making seizures of provisions and other things needed for the army and giving certificates therefor. He succeeded in doing this, in getting the supplies in regular ways, and in paying the obligations of the government far more promptly than before. Yet his sources of supply were limited—foreign loans to some extent; some aid from the Bank of North America, which he established; the use of his own means and credit, and the fitful and meagre supplies furnished by the States. Morris retired in 1784, and then the Board of Treasury was re-established, as there was no other person to whom Congress was willing to intrust so much power. The attention of the board was largely bestowed on the adjustment of the debt that had been incurred. but peace having been declared, no one was longer willing to do much; claims of all kinds remained unpaid; no authority indeed existed for anything, for the Confederation had no vitality, and thus the country drifted on in a miserable way, neglecting all its financial obligations, until the adoption of the Constitution in 1789.

III. *The Peace Period from* 1789 *to* 1861.—When the Constitution was adopted the experiment of maintaining a republican form of government for the first time was seriously begun. The Continental Congress was not a government—that body acted through sufferance and because the members were careful not to go beyond the limit of the popular will. The Articles of Confederation were without vitality. No government existed that could lay a tax for a dollar, and as the people would not give voluntarily to support the government, nor the States, nothing but disorder could exist. Out of this disorder and weakness arose the existing government. Sheer necessity forced people to unite. Their miseries were so great from self-destroying and also from outward forces that a plan of union was finally formed which has grown stronger with advancing years.

The first question that confronted Congress after assembling under the new Constitution was the funding and payment of the revolutionary debt. The greatness of the question was realized by some, who felt that the existence of the government was bound up with the settlement of it. Hamilton, the secretary of the treasury, was directed by Congress to consider the subject, and make a report thereon at the next session. During the Revolution he had furnished evidence of his financial genius by preparing a plan of a national bank which was submitted to Morris. When Washington was one day conversing with Morris about the finances of the country, he asked, "What are we going to do with this heavy debt?" to which Morris replied, "There is but one man in the United States who can tell you—that is Alexander Hamilton." Having been appointed secretary of the treasury, he now had the opportunity of telling Congress how to reduce the financial chaos then existing to order.

The debt was of two kinds, foreign and domestic. The foreign part was due to three nations, France, Holland, and a very small sum to Spain. The amount was known, and no one thought of doing other than faithfully fulfilling the contracts by which it had been obtained. The domestic debt was far more difficult to manage. It was composed of three branches. One branch covered the expenditures by the Continental Congress or general government. The evidences of this portion consisted of certificates of various kinds that were in the possession of creditors. In many cases, however, they had been transferred, and for varying sums, often far less than their face value.

Two questions were raised concerning them: ought the government to pay more than the present holders paid for them? and, again, if the government ought to pay more, should not the additional sum be paid to the original holders? Hamilton contended that the government ought to pay the full value promised in the certificates and to their present holders. Jefferson and Madison differed from him, but his view was adopted. The second branch of expenditures pertained to the expenditures incurred by the States for maintaining the war. Congress repeatedly promised while the war was going on to equalize the burdens of the States and thus to do justice to them, and when they adopted the Constitution and relinquished the right to collect taxes on imports, they did so expecting that the government would relieve them of their war burdens. They maintained that it would be a gross injustice to deprive them of their most fruitful source of taxation, and do nothing in the way of relieving them of their war burden. The contest over the question was prolonged and bitter, and the final action of Congress was regarded with doubt and alarm. The amount of the State debt was supposed to be about $25,000,000. Congress finally agreed to assume $21,500,000, and apportion this sum among the States. The members from the Northern States, which were the heaviest creditors, were in favor of assumption, while those from the Southern States were opposed. Hamilton's recommendation in favor of assumption was finally carried by getting enough votes to favor the measure on condition that enough members from the North would vote in favor of locating the capital on the Potomac to carry that measure. Thus the national honor was saved by bargaining away the location of the capital. The third branch of the domestic debt consisted of money advanced to the States by the Continental Congress and to that body by the States. No one knew what these amounts were, and Congress appointed commissioners to determine what was due "according to the principles of general equity."

Congress determined to pay these three branches in the following manner: interest at the rate of 6 per cent. was to be paid on two-thirds of the principal of the first branch, or debt contracted directly by Congress, after 1790, and on the balance after 1800, and 3 per cent. interest was to be paid on the interest which had accumulated on this portion of the debt. The government could redeem 2 per cent. annually of the portion bearing 6 per cent. interest and the portion bearing 3 per cent. whenever it desired. The second branch, consisting of the State debts, were funded in the following manner: four-ninths of the amount bore 6 per cent. interest after the end of 1791, three-ninths 3 per cent., beginning at the same time, and the remainder, two-ninths, 6 per cent. interest after 1800. The third branch of the domestic debt, consisting of loans by the Continental Congress to the States, and by them to the Congress, was adjusted by the commissioners. As whatever the States owed was due to the other States, of course the two sides of the account balanced. It stood thus:

Creditor States.		Debtor States.	
New Hampshire..	$75,055	New York..........	$2,074,846
Massachusetts.....	1,248,881	Pennsylvania......	76,009
Rhode Island......	299,611	Delaware............	612,428
Connecticut........	619,121	Maryland............	151,640
New Jersey.........	49,630	Virginia..............	100,879
South Carolina...	1,205,978	North Carolina...	501,082
Georgia..............	19,988		
Total...........	$3,517,584	Total...........	$3,517,584

The balances due to the creditor States were funded in the same manner as the second branch of the domestic debt. But the debtor States never paid their indebtedness. Thus this great question was finally settled. It should be added, however, that the plan of funding adopted by Congress was more intricate in several respects than Hamilton's plan. It bears the marks all over of compromise. It was the outcome of contending interests and sections. The opposition among the people to funding was strong in many quarters. Having in mind the history of the British debt, they believed that funding meant the perpetuation of the burden. They vented their opinions through the newspapers and pamphlets. The most able critic of the plan was Albert Gallatin.

Having funded the debt the next thing was to provide a plan for extinguishing the principal and raising the means to do this. Prior to 1800 the means for effecting this end were cumbrous. Hamilton, who displayed a bold genius in extricating the government from financial chaos, was under the spell of Walpole's sinking-fund theory, and reported an elaborate scheme for paying the debt by the operation of the sinking-fund machinery. Robert Hamilton had not yet exposed the utter fallacy of extinguishing debts in that manner. Commissioners were appointed for receiving that portion of the public income obtained from taxes and loans, which were applicable for discharging the interest and principal of the public debt. But no annual reduction of the public debt had been fixed, nor had any taxation adequate enough to effect a reduction gone into operation. It may be added, though, that all the debt purchased and redeemed was regarded as drawing interest as though unpaid, and the amount was paid to the commissioners as a debt-redemption fund. This feature of debt-paying is still maintained by several of the States and cities of the Union, and is embedded in the national sinking-fund law. When Gallatin became secretary of the treasury in 1801, another law was passed providing that $7,300,000 should be set aside annually for reducing the debt. This sum was fixed not arbitrarily, but because it was needed for paying the interest and principal, which could be discharged during the next two years. When, in 1803, Louisiana was purchased, $700,000 were added to the annual sinking fund.

For the first ten years of our history the public debt was not diminished, because the ordinary and extraordinary expenditures were so heavy that no surplus was left for such application. There was a war with the Indians on the frontier, a whiskey insurrection in Pennsylvania, a difficulty with the Barbary powers, while the conduct of both England and France rendered some war preparations necessary. Besides, the revenues from internal sources were not faithfully collected; evasions were great, and at that early day the government could not enforce its collections with rigor. Everything was new, much jealousy toward the government existed, and it could not be expected that the financial or any other machinery so soon would work perfectly. When, however, the war-clouds rolled away, and the Indian aggressions were quelled, the expenditures were reduced and debt-paying began. As it was not necessary to continue to collect internal revenue in order to get the needful supply of funds, these taxes were abolished in 1801. In order to put the debt more perfectly under the control of the government, Gallatin recommended that, with the consent of the creditors, a portion of the debt on which annuities had been paid should be changed into paid-up stock for the balance, payable at a fixed time. Congress authorized the change, and many creditors availed themselves of the privilege. In eleven years $46,022,810 were paid, leaving $45,154,189 unpaid. Had the second war with Great Britain not occurred this sum would probably have been paid in about the same time.

With respect to taxes, these were levied on imports and also collected for the first ten years from internal sources. The second act passed by Congress provided for taxing imports. The law was crude, and could not be otherwise in the beginning. It was revised from time to time, but during the first twenty years of our government, taxation of this nature was not heavy.

Internal taxation was less popular. Nevertheless, a large and intelligent class strongly favored the levying of such a tax for this reason, among others, that the people, feeling it more keenly than a tax levied on foreign goods, would be more watchful of the public expenditures. This certainly was a plausible supposition, but how completely negatived has it been by our experience in State and municipal taxation! One of the things that Jefferson promised to do if elected President was to repeal the internal taxes, and accordingly this was done, though contrary to the advice of his secretary. The revenues from imports, however, increased enough to cover the expenditures and reduce the debt, so no ill results followed their repeal.

In 1812 another war was on hand. The government long tried to escape, and various expedients were practised to maintain the national dignity, but they availed nothing. Gallatin was yet at the head of the treasury department, and the financial leader of his party, as much so as Hamilton had been of the other. His plan of finance for the emergency was very simple. He proposed that sufficient taxes should be laid to defray the ordinary expenses of the government, the interest on the old debt and the new one that might be created, while the war expenditures should be raised from loans. Six of these were made during the war, aggregating $80,952,800. They bore 6 per cent. interest. Gallatin thought that as our commerce would be idle, banks and individuals would readily lend their money to the government; and so they did, in those sections where the war was popular, which were the Southern and Middle States. After a short time, though, the credit of the government declined and lending was more difficult. The reason for this decline is easily explained: Congress would not adopt an adequate system of taxation. The members were willing for the secretary to borrow money to carry on the war, but unwilling to tax the people to pay the loan. The consequences of such a policy have always been the same at every age of the world: lenders are never willing to part with their money if it is to be lost; they are not more benevolent than other persons. They could not help seeing that the policy of Congress was utterly subversive of the national credit. The duties on imports were doubled; but as importations had greatly fallen away, not much revenue could be expected from this source. Gallatin strongly recommended the adoption of an internal revenue system, but his party, which had a majority in both Houses, were not prepared for the measure. They had always been opposed to such a system, and should they falsify their record? Nevertheless, they were obliged to do so. Every criticism they launched on the policy of the Federal party, when that was in power, could be repeated of the Republicans during the first sixteen years of their ascendency. They were obliged to increase the import duties, to restore the internal revenue system, and, finally, to charter another national bank. It should not be omitted that one reason why they so strongly opposed Gallatin's recommendations was, because they wished to destroy his influence and drive him from the treasury department. A strong cabal of his own party had been formed, which was under the leadership of Senator Smith, of Maryland, whose enmity sprung from Gallatin's condemnation of the wrong practices of his brother in the navy department. Gallatin was both honest and competent, and had his party adopted his recommendations, and laid adequate taxes at the outbreak of the war, and not frittered away the revenues of the government as they did for several years before this event, and contrary to his advice, and rechartered the United States Bank as he strongly desired, the credit of the government would have been maintained, and we should have been spared from chronicling the disgraceful fact that, in consequence of the wantonly wrong action of Congress, the $80,000,000 borrowed to carry on the war, after deducting discounts and depreciation, yielded only $34,000,000. Another expedient to raise money was to issue treasury notes; they bore $5\frac{2}{5}$ per cent. interest, ran for a year, and were receivable by the government for all dues to it. They were not a legal-tender, and their circulation therefore was at the will of the receivers; they were issued really in anticipation of taxes, and the amount increased until the close of the war. The last quantity, authorized in 1815, differed from prior issues in this, that notes for less than $20 were payable to bearer and did not draw interest. They were convertible into stock bearing 7 per cent. interest, and it was soon found that, though well adapted to serve as a circulating medium, they were converted into such stock almost as soon as issued. This led to a restricting of their issue to occasions of peculiar urgency, like paying the army, and also dividends on the public debt when local currency could not be procured.

When Gallatin's influence had become much impaired he was sent abroad in company with two other commissioners to negotiate a treaty of peace. He did not resign his secretaryship, for even then the President was unwilling to part with him. Gallatin had desired to retire long before, but the President insisted on his remaining. Notwithstanding the opposition to him in his own party, he was so skilled in finance, and could be so fully trusted, that Madison clung to him as his sheet-anchor. When the President found that the secretary's endeavor to stem the tide was hopeless, he unwillingly let Gallatin go abroad. As he had not resigned, Mr. Jones, the secretary of the navy, was made acting secretary of the treasury. He knew nothing about finance, and soon showed his inefficiency for the place. That was a time when the strongest man truly was needed; the very opposite idea had prevailed in making the selection. Finally, Gallatin sent his resignation, and the President then selected George W. Campbell, a senator from Tennessee, who had been chairman of the committee of ways and means, for the office. He desired another, Alexander J. Dallas, of Philadelphia, but as the Pennsylvania senators were opposed to him, the President turned aside in deference to their wishes. Campbell was not the man for so trying an occasion. Besides, he was in ill-health, and on the chief clerk devolved much of the work and responsibility of the office. After a short trial Campbell resigned. When this event happened, "tell Dr. Madison," said Senator Lacock, of Pennsylvania, to the President's private secretary, "that we are now willing to submit to his Philadelphia lawyer for head of the treasury. The public patient is so very sick that we must swallow anything the doctor prescribes, however nauseous the bolus." "His intrepidity and firmness," says Ingersoll, "gave fresh impulse to the war for the few months that it lasted after his coming, . . . and rescued the treasury from the disgraceful inanition it had fallen to during the prior twenty-eight months of hostilities. Arms, revenues, national power and resource were just elevated to the proper war-standard, when it ended—never till then." Dallas was favored by the situation. Congress had come to see that strong measures were necessary to save the country from destruction. The currency was fearfully depreciated at this time because a numerous brood of State banks had grown up after Congress refused to recharter the first United States Bank. To restore the circulation to a sound condition Dallas recommended the establishing of another bank, which was done, and which, moreover, speedily accomplished that result. (See article BANKING, Vol. I.)

The war having ended debt-paying was resumed. The annual sinking fund was increased to $10,000,000, but the revenues were not always large enough to furnish a surplus to this extent. Portions of the debt when maturing were extended, but in 1834 the last was extinguished. The taxation of imports was largely reduced in 1816, but in 1824 they were raised, and four years afterward yet higher. But the internal revenue system was repealed in 1817, nor was it revived until 1861. After the discharge of the public debt the revenues accumulated in the treasury from taxation and the sale of public land, and Congress finally voted to distribute all the surplus except $5,000,000 among the States in proportion to their population. This was in 1837. The amount to be distributed was $37,468,819.97. It was to be deposited with the States and subject to recall by the government. One-quarter was to be paid at the end of the third month until the completion of the distribution. After paying three-fourths of the amount a financial cyclone swept over the land, prostrating all business and bringing the government to the edge of bankruptcy. The revenues of the government were in the keeping of the State banks, where they had been put after their withdrawal from the United States Bank by R. B. Taney, the secretary of the treasury. As they were all swept away by the storm, they could not respond to the demand of the treasury department, and the government which a few months before had presented the unexampled spectacle among nations of such a plethoric treasury that an enormous sum had been really given away in order to get it out of the treasury, was now unable to pay its ordinary bills! This was an extraordinary state of things surely, but if American finance has many a splendid episode, many a stroke of rare financial genius, darker and unpleasant features also appear intermingled. Van Buren was now President, having succeeded Pres. Jackson, in March, 1837; and he convened Congress in extra session and rehearsed the dismal story. Once more treasury notes were authorized to pay the public expenditures, and these were put out, with some intermissions, until the close of the Mexican war. New loans were also contracted for the expenditure thus incurred, payable at fixed periods. After the war closed payment began, but in consequence of the long time the bonds could run, the secretary was obliged to pay a high premium to get hold of them for redemption.

With a few exceptions the revenues were ample to pay the public expenditures during the long period from the close of the second war with Great Britain to the opening of the civil war in 1861. W. H. Crawford, of Georgia, was at the head of the treasury department during the eight years of Monroe's administration. The revenues during the earlier part of this period were rather light, owing to the falling off in the imports and the hard times which prevailed throughout the country. Before the close of Monroe's first term, however, the country had recovered, and during Pres. J. Q. Adams' administration, when Richard Rush was secretary of the treasury, business prospered, general contentment prevailed, and no difficult questions troubled the treasury department. The eight years of Jackson's administration were not so serene. His first secretary of the treasury was S. D. Ingham, of Pennsylvania, who resigned for social reasons, which need not here be rehearsed. Louis McLane, of Delaware, was a worthy successor. The President was now engaged in the controversy with the United States Bank concerning the removal of deposits, and insisted that Mr. McLane should do this. He refused. Because he persisted in his refusal he was obliged to retire. He was succeeded by William J. Duane, of Pennsylvania, who was told by the President that if he would accept office he would not be asked to remove the deposits, and on this specific understanding accepted the office. No sooner had he been fairly installed in the treasury than the President asked him if he would not remove the deposits. When Duane reminded the President of his promise, the latter said he simply made the request; it was not compulsory, and hoped he would do as the President desired. It appears that the President thought that Mr. Duane was a flexible kind of man and would readily yield to his wishes. But Duane would not yield, nor would he resign his secretaryship. So the President removed him and transferred Mr. Taney, the attorney-general at that time, to the treasury department, where he was willing to do the President's bidding. The President afterward richly rewarded him by appointing him successor of the illustrious Marshall, chief-justice of the Supreme Court of the United States, over which he presided for thirty years, when he was succeeded by another secretary of the treasury, Salmon P. Chase. To fill the vacancy caused by Mr. Taney's retirement Senator Woodbury, of New Hampshire, was appointed, who served through the remainder of Pres. Jackson's second term and also during that of Mr. Van Buren. When Gen. Harrison became President he appointed Thomas Ewing, of Ohio, but the President's early death wrought serious changes in the cabinet. Ewing soon resigned after Mr. Tyler became President, and Walter Forward, who had been appointed first comptroller by Pres. Harrison, became secretary of the treasury. He remained in office long enough to make two annual reports and then the third appointment was made, John C. Spencer, of New York. The President sent in the name of Caleb Cushing, but the Senate refused to confirm him. Mr. Spencer remained in office a few months, and George M. Bibb, of Kentucky, served during the remainder of Pres. Tyler's troubled term. During the four years of Pres. Polk's administration Robert J. Walker, of Mississippi, was at the head of the treasury department. By many he is regarded as one of the ablest men who ever filled that office. He was succeeded by William M. Meredith at the opening of Pres. Taylor's administration, and on the death of the latter Mr. Fillmore appointed Thomas Corwin, of Ohio, secretary. James Guthrie, of Kentucky, served under Pres. Pierce, and Howell Cobb under Pres. Buchanan. In 1857 the tariff was reduced; soon afterward, however, a panic desolated the country, the revenues fell off, and were not sufficient to pay the ordinary expenditures. Several movements were made to increase the revenues, but all proved unavailing, and at the expiration of Mr. Buchanan's administration the government had increased its debt to $60,000,000.

IV. *The Civil War Period.*—We have thus traced the outline of our history to the civil war in 1861. Salmon P. Chase, of Ohio, was secretary of the treasury. He declined the appointment when it was first tendered to him, but finally accepted through the earnest solicitation of Horace Greeley and other friends. He was a lawyer by profession, had had no financial experience, and realized his unfitness for the place. Nevertheless, he accepted and entered on the duty at a most inauspicious time. Howell Cobb, above mentioned, had done his utmost to ruin the credit of the government, and though Gen. J. A. Dix served during the expiring months of Mr. Buchanan's administration, after Mr. Cobb's retirement, the time was too short to effect much of an improvement. He borrowed a small amount of money, paying 12 per cent. interest. To such a condition was the public credit reduced at the opening of the conflict. Congress, near the close of the session of 1860–61, had enacted a new tariff law increasing duties, and had also authorized the secretary to borrow more money. The uncertainties of the future led to great prudence among business men, and trade and business of every kind fell away. No one could foretell what was coming, and for a year after the war began business was timid, though the enormous operations of the government absorbed capital and every form of activity, and therefore the stagnation of trade was not so marked to the people. The imports revealed the story, for these fell off and the supply of revenue from that source was disappointing. Mr. Chase negotiated loans for a small amount under the authority already existing, and on the 4th day of July, 1861, Congress convened to enact further measures for suppressing the war. A loan of $250,000,000 was authorized, the duties were increased, an internal revenue system was adopted, and a direct tax of

$20,000,000 was laid. The States were offered 15 per cent. reduction if they paid the tax, and this course was taken by all the States except those in rebellion, Delaware, and two of the Territories. Tax commissioners were appointed to enforce the law in the insurrectionary States, and they made levies and sold land, and after a long effort collected a portion of the tax assessed on them. As soon as the session closed Mr. Chase went to New York and negotiated a loan of $150,000,000 with the New York banks and those of Boston and Philadelphia. Never had such a large loan been contracted before in this country, but the banks were patriotic, the war fever was high, and though the figures were nearly as great as their associated capital they made the loan. The banks proposed that they should pay their respective portions over to one or two banks, and that the secretary should draw it out by issuing checks like an ordinary borrower. In that event they would pass through the clearing-house and be easily paid; indeed, would add only a million or so to the $20,000,000 that were daily passing through that institution for settlement. Congress had passed a law in the summer session of 1861 authorizing the secretary of the treasury to suspend the operation of the sub-treasury law, as it was called, which was passed in 1846, and prohibited the officers of the government from receiving anything beside specie from debtors. The banks were very desirous that the secretary of the treasury should exercise this authority, assuring him that if he did so they could easily make their payments, and that the loan, large as it was, would not disturb the money market. To their surprise he refused, and insisted that the banks should pay in gold. They undertook to do so, but sought a promise from him that the treasury notes, which he had been authorized to issue at the July session to the extent of $50,000,000, should not be issued. Though not making any formal promise he assured the banks that their wishes should be regarded. Very soon, however, the notes began to appear in circulation. The effect of this step was soon apparent. The banks could provide for the redemption of their own circulation, but as the government had only so much gold as the banks could furnish, which of course was soon paid out at the sub-treasuries for army and navy and other supplies, either the banks must provide for the redemption of the government notes, or they must circulate without any foundation to sustain them. Naturally the banks were afraid of them, and they caused trouble. They appeared in small quantities at first, and so long as this was the case the gold paid out by the banks to the government quickly came back again in the way of ordinary deposits, and all went well. But as soon as the quantity of the treasury issues became considerable the gold did not return to the banks as before, and seeing that it was rapidly disappearing the banks, on the 28th of December, 1861, concluded to suspend specie payments on the Monday following (30th). Of course, the government was obliged to do the same thing, and thus the secretary, by ignoring the advice of the banks and refusing to suspend the sub-treasury law, was quickly brought to the end of the road. It is the opinion of many that had Mr. Chase followed the advice of men not less patriotic than himself and comprehending far more perfectly the nature of the situation that the suspension of specie payments might have been averted, or deferred until near the end, in which event the evil consequences would have been fewer and less momentous than they were from the suspension so early in the struggle. The banks completed their engagement by paying in treasury notes, and after a considerable delay sold their bonds, and on some of them realized a considerable profit. But for a considerable period after getting them, contrary to their expectation, there was no market, and they were obliged to keep them or sell them at a sacrifice.

What was to be done now? Congress was in session, but knew not how to act. The business of the government could no longer be maintained on a specie basis, that was certain. Nor could the notes of suspended banks used for a circulating medium be used without danger. For, all responsibility for their redemption having ceased after suspension had been declared, what prevented them from issuing all they could get out? In some States there were severe laws against the issuing of notes by suspended banks, especially in New York, which was the leading banking State in the country. It was shown that the banks might continue to issue their notes in safety by the imposition of a heavy tax on all issues exceeding a safe amount. Public sentiment, however, rapidly centred on the plan of issuing more treasury notes, but possessing a legal-tender quality. A bill was introduced into the House for the issue of $50,000,000 of such notes. It was considered in committee, the amount was increased to $100,000,000, and reported favorably by one majority, and the vote of this member was thus cast in order that the bill might be reported, and not as an expression of his real opinion. A long debate ensued, relating chiefly to the constitutionality of the bill. The Constitution provides that Congress shall have power "to coin money, regulate the value thereof," and "no State shall . . . make anything but gold and silver coin a tender in payment of debts;" and it was strenuously maintained that such an act was a direct violation of it, yet the bill passed the House authorizing the issue of $150,000,000, and subsequently it passed the Senate, and was signed by the President. The House bill was amended in the Senate, one of the principal changes consisting in making customs dues an exception, and requiring importers to pay in gold as they had always done. This amendment, after a strong contention between the two Houses, prevailed. The amount issued was speedily absorbed, and a second bill was introduced for the issue of a similar amount. When the first bill was before the House, Mr. Hooper, of Massachusetts, one of the most intelligent members of that body, remarked: "It is said that when a government once assumes the power to issue a currency, the temptation to continue issuing it rather than resort to the more unpopular method of taxation is so great that it will not cease to issue it until it finds itself in a state of utter bankruptcy. The answer to this objection is, that the power of the government is limited by the law in this respect to $150,000,000, and consequently the government cannot, if it would, yield to any such temptation." Yet how soon was this remark falsified! Many who voted for the first bill strongly opposed the second; but it passed through and became a law, and this amount, too, was soon issued, thus enormously swelling the volume of circulation. The banks, though prudently confining their issues for a time after suspending specie payments, turned a fresh issue into the swollen stream. As soon as the legal-tender notes appeared, the banks could legally use these for redeeming their own issues, and thus the way had been made easy for an enormous inflation. Some of the banks did, in truth, collect the legal-tender notes and substitute their own to a much larger amount. This was one of the causes of enmity on the part of Congress against the banks, and helped onward the creation of a rival system, and the imposition of the tax of 10 per cent. on the State bank issues, which finally drove them out of existence.

The same law which authorized the first issue of legal-tender notes also authorized the issue of $500,000,000 of bonds bearing 6 per cent. interest and payable after five and within twenty years. The interest was payable in gold collected from import duties, and at this early date Congress also provided that 1 per cent. of the public debt should be discharged annually. At first the bonds sold very slowly, but in the meantime the government procured considerable funds by two kinds of temporary loans. The first consisted of certificates of indebtedness, which were nothing more than certificates given to such creditors of the government as would take them, payable in a year, or sooner if it desired, and bearing 6 per cent. interest. The other kind of temporary loan consisted at first of $25,000,000, and finally increased to $100,000,000, of deposits of treasury notes by the banks to the government, which bore not exceeding 5 per cent. interest, and which they could demand after thirty days' notice. To some members of Congress this operation of the treasury seemed to be wholly for the benefit of banks, as the government could make no use of money which it was liable to pay at such a short notice. In truth, however, the government did use all of the money thus loaned, so that it was a highly favorable operation of the government. To provide more adequately for the payment of these deposits, if they should be demanded when the government was not able to respond, the secretary of the treasury was authorized to issue $50,000,000 of legal-tender notes, in the event that they should be wanted for that purpose.

When the country became deluged with paper-money and many had rapidly acquired wealth for investment, and the government bonds were considered as good as any other, their purchase began. Arrangements were made with a banking-house, Jay Cooke & Co., for the sale of them, and they, through commendable energy, succeeded in selling large quantities. They became very popular, and the secretary having now found a way for replenishing the treasury, ought to have continued so long as people were willing to buy and money was wanted. Instead of doing this, he discontinued their sale, and ordered the sale of another kind of bond bearing only 5 per cent. interest. He was besought not to try so hazardous an experiment, but he could not be dissuaded. The 5 per cent. bonds were put on the market, but fell flat. No one wanted them; it was an unusual rate of interest. The public indebtedness rapidly increased. Mr. Chase was besought to return to the 6 per cent. issues. But he was inflexible, and he would not acknowledge his mistake. The soldiers wanted their pay, and there was no money to pay them. In this dilemma, resort was once more had to the paper-mill. Another $100,000,000 of legal-tender notes were authorized beside the $50,000,000 above mentioned. Pres. Lincoln signed the bill with great reluctance, and said he would not have done so had the occasion been less urgent. It is unquestionably true that the country would have been spared this third issue had Mr. Chase continued to offer 6 per cent. bonds, instead of withdrawing them and offering 5 per cent. This experiment was the most costly to our government of any that has ever been tried.

At the end of the fiscal year 1864, Mr. Chase resigned and Senator Fessenden, of Maine, who had previously served as chairman of the finance committee of the Senate, was appointed. Confidence revived under his management, and bonds began to sell. Beside bonds another kind of loan had been tried, namely, treasury notes running for 1, 2, and 3 years, and bearing 6 per cent. interest in coin. The amount became so large, considering the other coin obligations, that the plan was adopted of issuing them bearing 7$\frac{3}{10}$ currency interest. Secretary Fessenden served only to the 4th of March, 1865, when he was succeeded by Hugh McCulloch, who paid the greater portion of the remainder of the war obligations in treasury notes of this nature. The principal acts authorizing loans beside the legal-tender notes were passed Feb. 25, 1862, which authorized $500,000,000 of bonds; the $900,000,000 loan act of March 3, 1863; the $200,000,000 loan act of March 3, 1864; the $400,000,000 act of June 30, 1864, and the $600,000,000 act of March 3, 1865. There were other acts, but these five contained the authority for making the great loans of the war.

Let us now briefly consider the war-taxation. Secretary Chase recommended, in his annual report at the close of 1862, the raising of $50,000,000 from internal sources. Congress more perfectly gauged public sentiment and the needs of the situation, and voted to raise from all sources $150,000,000. The committee of ways and means, through an able sub-committee, proceeded to prepare a bill. This work ought to have been done by the treasury department before the convening of Congress, and if it had been, several months of valuable time would have been saved and a revenue collected more quickly, and when the effect would have been most beneficial in sustaining the public credit. The bill was prepared as quickly as possible, but the discussion of it was elaborate, and not until July 1, 1862, did it become a law. It provided for the taxation of spirits and liquors of all kinds, of manufactures, for issuing licenses for conducting many kinds of business, for the taxation of incomes; in short, it swept over a wide field. Perhaps the most serious defect was that it did not provide for the immediate taxation of distilled spirits. The postponing of its operation in regard to them led to a series of gigantic speculations. The higher the tax, the more could be made by its imposition; and it is one of the singular facts of our war-history that, instead of looking with disfavor on it, many interests, perceiving how they would be benefited by increasing taxation, were eager for an advance. Just as the war closed the system became efficient, and for the fiscal year 1866 it yielded $310,906,984. With every increase in internal taxation the tax on imports was increased in order to prevent the manufacturer from suffering by the advance. Imports, nevertheless, were enormous, for money was abundant, every one was employed, wages and salaries were high, and consequently the demand for all kinds of commodities was great. All classes were flourishing, but there were persons who saw clearly that this period would come to an end, and wise were they who put their houses in order in season. The war closed in April, 1865; the debts paid during the next five months were enormous, and on the 1st of September of that year the debt reached its greatest height. Deducting the cash in the treasury, the amount was $2,756,431,571. The cost of the war, deducting for the expenditures that would probably have been incurred had the nation remained at peace, was, according to the best calculation, $6,189,929,908. Let us hope that this huge war-bill is the last.

V. *From the Close of the War to* 1885.—When Congress discussed the legal-tender bill, one of the leading objections to it was its unconstitutionality, G. H. Pendleton, of Ohio, making perhaps the strongest speech on that side. The State courts decided in favor of the law, with the single exception of the Supreme Court of Pennsylvania. The Court of Appeals of New York at an early day declared the law to be constitutional. But all felt that the question would not be settled until it reached the United States Supreme Court. When it finally came before that tribunal, in 1867, Mr. Chase was the chief-justice. He and three of his colleagues decided against the constitutionality of the law, the other three dissenting. At the time of rendering this decision two vacancies existed, which were soon after filled. The attorney-general, E. R. Hoar, then applied for a reargument of the question in another case. He claimed that the former decision had been made when the bench was not full, and that a question of such transcendent importance ought not to be declared as definitely settled until all the members had expressed an opinion. The judges who concurred in the opinion given were opposed to opening the question; but those who dissented uniting with the two new appointees, constituted a majority and decided in favor of another argument. The decision in the second case sustained the law. At a later period another question was raised, namely, that admitting it was constitutional to issue such notes in time of war, could this be legally done in a time of peace? The court in the second case maintained that if the issuing of such notes was necessary to supply the absolute necessities of the treasury, that if nothing else would have enabled the government to maintain its armies and navy, nothing else would have saved the government and the Constitution from destruction while the legal-tender acts would, could any one be so bold as to assert that Congress had transgressed its powers? Whether they were needful, the court declared, was a question for Congress to decide. If it was a question for Congress in the second case it was equally so in the last case, so the court decided, and thus the law stands. This case was decided in March, 1883. It was supposed by many that specie payments would be resumed soon after the war closed, and had this event happened the Supreme Court would not have been confronted with these questions. A long time was to pass, however, before they could be resumed. Mr. McCulloch favored their speedy return, and in his first report made some strong recommendations on the subject. Congress, after a long debate, authorized the secretary to retire $4,000,000 of treasury notes a month; but after he had executed this policy for a period of 22 months, Congress rescinded the law, and though the subject was constantly discussed in and out of Congress, not until 1875 was a law enacted for resuming specie payments, and even that put the time off until Jan. 1, 1879. The main features were the withdrawal of $80 of the legal-tender notes for each issue of $100 of national bank notes, until the aggregate amount should be reduced to $300,000,000 and the accumulation of coin from customs duties and the sale of bonds. One of the grave objections to the law was, could the treasury notes thus withdrawn be reissued? It was seen that if they could be the intent of the law could be defeated. It was a defective, double-faced law, but it was the best that could be enacted. Opposition in Congress to any kind of a resumption measure was strong. Happily, Senator Sherman, who framed the law, became secretary of the treasury in March, 1877, and through his wise efforts a sufficient quantity of coin was accumulated, and the long-delayed event came around without the disturbance of any interest. The premium on gold ran down, the foreign exchanges were in our favor, gold flowed here in large quantity to pay for exports, the banks cordially co-operated with the secretary, and when the day for resuming arrived no demand for coin occurred, nor has the treasury at any time suffered from the presentation of the treasury notes for payment.

Next to the resuming of specie payments the payment of the public debt has engaged the attention of Congress and the people. If the debt was heaped up with extraordinary rapidity its reduction has astounded the great nations of the old world. The first considerable portion of the debt to mature were the two and three-year treasury notes, amounting to $830,000,000. Before their maturity had arrived a portion had been paid and another portion had been converted into bonds running for a longer date. In 1870 a funding law was enacted whereby the treasury department was able to refund the obligations of the government into others bearing a lower rate of interest. The new bonds were sold by various arrangements with bankers, and, as the credit of the government improved, the secretary was able to sell them on better terms. Of these, $250,000,000 were sold at 4 per cent. interest; afterward Mr. Sherman sold $737,691,550 at 4 per cent.; finally a portion was continued, though at a lower rate of interest, 3½ per cent., and, lastly, a large quantity at 3 per cent. Payment has gone on with few interruptions since 1865. After 1873 there was a short period when debt reduction was slow, and now and then a monthly debt statement has shown an increase. The people very generally have favored this policy of debt-paying, and have rejoiced over the statements showing large reductions.

To reduce the debt so rapidly, however, heavy taxes have been necessary. The import duties were not much changed until 1883, though large reductions were made in internal taxation. When the war ceased, the demand for things speedily fell away. War is an exceedingly wasteful business. The various interests then felt the pressure of taxation and loudly clamored for relief. Of course, a system devised so hastily, and extending so widely, was very imperfect, and Congress would have acted more wisely if while throwing off taxes it had also in many instances readjusted them. This easy method of Congress, though affording relief, did not always remove inequalities. The following table shows the reduction in internal revenue taxation:

July 13, 1866	$65,000,000	July 14, 1870	$55,000,000
March 2, 1867	40,000,000	June 6, 1872	20,651,000
Feb. 3, 1868	23,000,000	March 1, 1879	13,273,148
March 31, 1868 July 20, 1868	45,000,000	March 3, 1883	31,955,332

The revenues were so large that, notwithstanding the reduction of the debt, a large amount was left for expenditure in other ways. The ordinary expenditures had swelled from the expansion of the government; but, beside these, enormous sums were appropriated for pensions, river and harbor improvements, public buildings in many of the cities of the Union, and other purposes. Perhaps the most reckless expenditure authorized during this period was by the Pension Bill of 1879. This measure, under which an enormous sum has been already paid, was passed by both Houses almost without explanation; nor has the expenditure yet been completed.

After the suspension of specie payments in 1861, Congress was not much troubled with coinage questions for many years. The size and composition of the cents were reduced during the war, and in 1870 the laws regulating coinage were revised. This work was first done, at the request of the secretary of the treasury, by Mr. Knox, the comptroller of the currency. Among other alterations which he reported as desirable was the discontinuing of the coinage of silver dollars. None had been coined since 1809, and none circulated; for this reason, among others, they were worth more than gold ones. The report was carefully considered by both Houses, far more so than reports usually of that nature. But slight opposition appeared to the recommendation in either House. Four years afterward, when the statutes of the United States were revised, the legal-tender quality was taken from the silver dollars in all payments exceeding $5. Hardly had this law gone into operation, when silver, as compared with gold, began to fall rapidly in price. Then a movement was started to restore the coinage and legal-tender power of silver. A monetary commission was appointed to examine the subject, which made one of the most elaborate investigations of the kind in our history. In 1876 a bill was introduced into the House providing for the free coinage of silver. The bill was amended, the amount was limited to $4,000,000 a month, and passed. Pres. Hayes vetoed it, but having been passed over his veto became, and still is, a law.

With respect to those who administered the finances of the government, it may be stated that Hugh McCulloch served during Pres. Johnson's administration, and George S. Boutwell during Pres. Grant's first term (1869–73). Mr. Boutwell had previously served with considerable distinction as the first commissioner of internal revenue. On being elected to the Senate from Massachusetts he resigned, and W. A. Richardson, who had formerly served as assistant secretary, became secretary. After fifteen months' service he retired, and Benjamin H. Bristow filled the office for two years (1874–76), and was succeeded by Lot M. Morrill, who was taken from the Senate, and served during the remainder of Pres. Grant's second term. During the next four years John Sherman was secretary of the treasury. Pres. Garfield appointed Senator Windom, of Minnesota, but when Mr. Arthur entered the Presidential chair, Judge Folger, of New York, was made secretary of the treasury, and held the office until his death in September, 1884. During the remainder of Pres. Arthur's term, W. Q. Gresham and Hugh McCulloch successively held this important office. (See TAXATION.) (A. S. B.)

FINCH, the common name given to a very large family of birds, the *Fringillidæ*, which comprise one-eighth of North American birds, and include the several tribes of sparrow, linnet, bunting, crossbill, greenfinch, goldfinch, etc. As a rule they are plainly clad, though some are brightly colored. Their most common feature is their short, thick, cone-shaped bill, which is well adapted to crush seeds, their chief food, though they eat insects and worms to some extent. The true finches form a group, *Fringillinæ*, of which the typical genus is *Fringilla*. The members of this genus have long and pointed wings, and a slightly forked tail. They include the chaffinch, siskin, goldfinch, linnet, snow bird, yellow bird, etc. These birds are very widely distributed, and live in flocks, though they are not truly gregarious, feeding on seeds in winter, and on larvæ, grain, etc., in summer. The genus includes more than 80 species, according to Gray, some of which are very sweet singers. The Bramble finch or Brambling (*F. montifringilla*) is the type. Of the American species, the pine finch (*F. pinus*) is common in the pine forests throughout the United States. It is of a yellowish gray above, and whitish below, the wings and tail being dusky with white edges. Length 4¾ inches. The yellow bird, or American goldfinch (*F. Chrysomitris tristis*), is a beautiful species, closely resembling the European goldfinch, but with more yellow in its plumage. Among American finches of related genera may be named the grass finch, the sea-side finch, and Lincoln's finch, a bird witn a sweet and loud song, that is found from Labrador to Guatemala. Of introduced species of finches, the best known are the canary, and the English sparrow, which is increasing so rapidly as to drive off many of the native species. The finches, as a rule, do not migrate, being hardy enough to bear the winter weather. Some, as the snow birds, are found in very cold climates.

See Vol. IX. p. 167 Am. ed. (p. 191 Edin. ed.).

The Bramble Finch (*Fringilla montifringilla*).

FINLAND. In recent years Finland has made steady if not rapid progress. The population, which at the end of 1875 was 1,912,647, was on Jan. 1, 1881, 2,081,612, showing an average increase of 33,793. There were at that date 43,238 more women than men. This is accounted for partly by emigration, partly by the effects of drink, but principally by accidents. Finland having an extensive sea-coast and great lakes, a large portion of her male population are engaged in hazardous marine enterprises, and about 550 men are drowned every year. In the above statistics the Russian soldiers temporarily stationed in Finland are not included. Neither are the Jews, as they are not considered to be citizens. The population of the four principal cities of Finland was, Oct. 1, 1880: Helsingfors, 43,142; Abo, 22,967; Wiborg, 14,668; Tammerfors, 13,750.

See Vol. IX. p. 188 Am. ed. (p. 216 Edin. ed.).

Religion.—Of the population of 2,081,612 the large proportion of 2,060,535 are Lutherans; 38,757 belong to the Orthodox or Russo-Greek Church, and 2,320 are Roman Catholics. These last two denominations are found almost exclusively in Helsingfors and Wiborg. The Lutheran clergy are a body of intelligent, faithful, and hard-working men. There are 900 of them, with two bishops and one archbishop. The Finns, both men and women, are a church-going people.

Commerce.—The exports, which in 1876 were of the value of about $19,200,000, had risen in 1882 to 19,873,130 marks, or $23,135,514. The imports in the same time had risen from about $27,000,000 to 167,054,387 marks, or $34,041,497. The commerce with Russia is of the greatest magnitude, and embraces nearly one-half of the whole, both of exports and imports. Next in importance comes the commerce with Germany, and then with Great Britain. The imports from the United States reach the value of 2,200,000 marks, or $424,600 per annum, and consist principally of cotton and petroleum.

The principal exports of Finland are wood in its various forms, such as fire-wood, boards, plank, lath, etc., etc.; butter, rye, and oats. The supply of wood is inexhaustible unless destroyed by fire, and this the government has taken efficient means to prevent; for the forestry laws of Finland are excellent, and are strictly enforced. A proprietor's woodland is divided by government officers into thirty sections. He may cut one of these sections each year, but no more. The butter is excellent, and is made in large quantities, being exported to Russia and to England. The pasturage is good, and, when that fails, the cows find nutritious food in browsing. The rye is probably the best in the market, and is largely exported to Sweden. The oats are shipped to Great Britain.

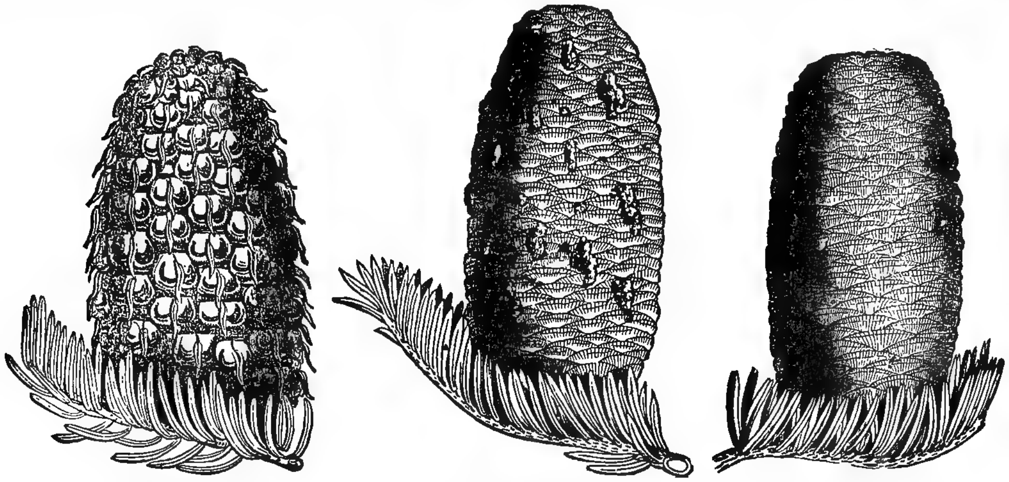
Debt.—The public debt, Jan. 1, 1883, was 70,085,739 marks, or $13,526,548. The finances are in excellent condition, the receipts being equal to the expenses. The currency is gold, silver, and paper, the paper being at par with gold, and consequently preferred. The unit of value is the mark, which is the equivalent of the franc, or $0.193, or about 19⅓ cents. The penni is the $\frac{1}{100}$ part of the mark, and answers to the centime.

Language and Literature.—The official language is now Finnish. Until a very recent date it was Swedish. This is still the language of the better classes and of the higher orders of literature. The famous Finnish poet, Runeberg (died May 10, 1877), wrote in Swedish. His poems are remarkable for their imagery, for their beautiful descriptions of nature, and for the smoothness of the versification. Many of them have been translated into German, and some of them into English. Runeberg may be justly said to rank with Tennyson, and with other of the most eminent poets of modern times.

FINLEY, James Bradley (1781–1856), an American clergyman, was born in North Carolina, July 1, 1781, being the son of Rev. R. W. Finley, a Presbyterian minister. In 1801 he removed to Ohio, and in 1809 he joined the Western Conference of the Methodist Episcopal Church. He itinerated for six years, and became presiding elder. He was a missionary among the Wyandot Indians on the Upper Sandusky, 1821–29, then preacher or presiding elder in Southern Ohio, 1829–45, and afterwards was chaplain of the Ohio penitentiary until 1849. He died Sept. 6, 1856. His works include *Wyandot Mission* (1840); *Life among* *the Indians* (1857); *Sketches of Western Methodism* (1857); *Prison Life* (1860); and an *Autobiography* (1854).

FINLEY, Samuel (1715–1766), an American Presbyterian minister and educator, was born in Armagh, Ireland, in 1715. He removed to Philadelphia in 1734, studied theology, and after ordination in October, 1742, was chiefly engaged as an itinerant in the "Great Revival." In 1744 he settled at Nottingham, Md., where he remained as pastor seventeen years, conducting also an academy of high reputation. On the death of President Davies of the College of New Jersey, Mr. Finley was chosen to succeed him, and removed to Princeton in 1761. He edited the sermons of President Davies, and published some of his own. His grandson, W. P. Finley, LL. D., was president of Charleston College, S. C., for some years.

FINNEY, Charles Grandison (1792–1875), an American preacher, was born at Warren, Litchfield co., Conn., Aug. 29, 1792. He reached manhood on his father's farm, then went to Jefferson co., N. Y., where he studied law, but in 1822 was ordained a minister. He labored with great fervency and success as a revival preacher and in 1835 accepted a professorship in Oberlin College, Ohio, then recently founded. In 1837 he became also pastor of the First Congregational Church in Oberlin. He spent three years (1849–51) in England and by his fervid eloquence exerted a powerful influence in the non-conformist churches. From 1852 to 1866 he was president of Oberlin College. He died at Oberlin, Aug. 16, 1875. Besides his prominence as a revivalist he was noted for his opposition to secret societies. His publications include *Sermons on Important Subjects* (1836); *Lectures on Revivals* (1835); *Lectures to Professing Christians* (1836); *On Sanctification* (1840); *Systematic Theology* (1847); *Guide to the Saviour;* all of which had a wide circulation. His theological system was largely based upon man's free will, and was severely criticized by Rev. Dr. Charles Hodge. See *Memoirs of Charles G. Finney, with an Autobiography* (1876).



Abies nobilis. Two-thirds natural size. *Abies amabilis.* One-third natural size. *Abies grandis.* Two-thirds natural size.

Cones and Leaves of American Firs.

See Vol.IX. p. 193 Am. ed. (p. 222 Edin. ed.).

FIR, the common name given to many species of coniferous trees, often extended to include the genus *Pinus*, but more usually restricted to the genus *Abies.* The species of this genus are known somewhat indifferently by the common names of fir, spruce, and hemlock, but we restrict ourselves to those that are particularly known as firs. This genus bears its fertile flowers in catkins, consisting of open imbricated carpels in the form of scales subtended by a bract. The fruit forms a *strobile* or cone, whose scales are thin and flat, not thickened at the apex, nor with a prickly point. The seeds have a persistent wing. The leaves are not clustered like those of the pines and larches, but are scattered upon the shoots, needle-like in shape, and frequently two-ranked or doubled. The trees are usually of an attractive pyramidal shape, sending out annually a whorl of branches from the foot of the leading shoot. They are much used as ornamental shade trees. Those known specially as firs bear erect, lateral cones. Of these our most important Eastern species is the balsam or balm of Gilead fir (*A. balsamea*), the source of the well-known Canada balsam. It is a handsome, quick-growing, short-lived tree, from 40 to 60 feet high, with a slender trunk, and of little value as timber. The cones are cylindrical and large. The bark is smooth, but covered with small sacs or blisters, filled with a transparent liquid resin, of honey-like consistency, which exudes on puncturing, and is caught in suitable vessels. It is used in making delicate varnishes, and is of great value as an agent in the mounting of microscopic objects. The tree grows in cold, damp woods and swamps from New England to Wisconsin and northward. *A. Fraseri*, the small-fruited or double-balsam fir, is a tree which somewhat resembles the above, but has much smaller cones. It also yields the Canada balsam. It occurs on the mountains of Western New England and of Pennsylvania, and is common southward on the highest Alleghenies. The Western coast region of North America is remarkably rich in firs, often of immense size. Of these the most common is *Pseudotsuga* (*Abies*) *Douglasii*, the Douglas or red fir, which forms seven-eighths of all the forest growth in Oregon and Washington Territory, and extends from British Columbia to California, and along the mountain ranges into Mexico. It is a very large tree, growing from 200 to nearly 300 feet high, and 8 to 10 feet diameter, and is the most valuable timber tree of the Pacific region. It often forms extensive forests, almost to the exclusion of other species. The wood is hard, strong, and durable, in color from light red to yellow, and is largely manufactured into lumber, used for all kinds of general construction. The bark is found valuable in tanning leather. *A. concolor*, the white or balsam fir, is a tree of 100 feet in height, found on the moist slopes of the mountains from Oregon to Arizona, and to the Pike's Peak region of Colorado. It is greatly developed in the California sierras. The wood is light and soft, and of little value. *A. bracteata*, of the Santa Lucia Mountains of California, reaches a height of nearly 200 feet, and forms a heavy, compact though not hard wood. It will probably prove one of the most valuable of the

North American Abies. *A. amabilis*, the lovely silver fir, is found from British Columbia to Oregon. and reaches a great development in the Cascade Mountains. It is from 100 to 200 feet high, its wood a light brown hue, hard, but not strong. *A. nobilis*, the noble silver fir, is a tree from 200 to 300 feet high, found in the mountains of Oregon. It forms, with *A. amabilis*, extensive forests along the slopes of the Cascade range. The wood is light, hard and strong, of a light brown color with red streaks. *A. magnifica*, the red fir, occurs on Mount Shasta, California, and along the west slope of the Sierra Nevada. It is a large tree, of over 200 feet high and 7 to 9 in diameter. The wood is light, soft, not strong, rather close grained, of a satiny, light red color. It is largely used for fuel, but is of little value for other purposes. *A. grandis*, the white fir, occurs from Vancouver's Island to California, reaching its greatest development in the moist bottom lands of West Washington and Oregon. It grows from 200 to 300 feet high and 5 feet diameter. The wood is light and soft, and is manufactured into lumber, and used for some building purposes. *A. subalpina* occurs from Alaska to North Oregon. It is a scattered tree, 100 feet high, and of little importance. These trees are remarkable for their perfect conical forms. Yet though perfect in outline they are less graceful than the spruces. Their timber, in most cases, is of little economical importance. (C. M.)

See Vol. IX. p. 202 Am. ed. (p. 233 Edin. ed.).

FIRE DEPARTMENTS. The fire departments of America are of two general classes: (1) the departments of large cities, composed of officers and men who devote their whole time to the calling, and are paid for their services; and (2) those of smaller cities and villages, composed wholly or chiefly of volunteers, who pursue their own avocations but respond to calls for duty, and are not paid, but generally enjoy exemption from jury and militia duty during their service as firemen, and after discharge therefrom, and are also sometimes allowed a slight reduction in taxation. The first of these classes is commonly known as *paid*, and the second as *volunteer department*. In some of the minor cities there are also departments made up partly of full-paid firemen and partly of volunteers, or call-men, who are subject to duty during the day on call only, and to full duty at night, for which they receive suitable compensation. Such departments, unless the paid element preponderates over the volunteers in numbers, are considered as belonging to the second class.

The best organized fire departments of the United States provide not only for the extinguishing of fires but also for their prevention, by regulating the storage, sale, and transportation of combustibles and explosives, ascertaining the causes and origin of fires, and the detection of incendiaries.

In New York and Detroit the supervision of the construction of buildings and of their alteration and repair is also imposed upon the fire department. In the first-named city this important branch of the municipal service has been more economically administered (notwithstanding an enormous increase in its business), and is far more efficient, than it was as a separate and independent department of the city government. This result was foreseen and is not unnatural, for no other department or branch of the municipal service can have so great an interest in improving the stability and general security of structures as the fire department, the members of which are so often compelled to risk their lives in burning buildings in efforts to save the lives and property of others. Such adjuncts to the fire-extinguishing corps are valuable as preventives of fire, and necessary in all well-organized fire departments.

In the organization, equipment, and government of fire-extinguishing corps the climate, the topography of the city to be protected, the character of its industries, its water supply, the size, height, and general construction of its buildings, the proportion of buildings used wholly or partly for dwelling purposes to those used exclusively for business purposes, and the character of its inhabitants, are conditions to be considered. A striking example of the extreme dissimilarity of large American cities with respect to to these conditions is afforded by the cities of New York and Brooklyn, which, though separated only by the East River, have nevertheless but one of these conditions, that of climate, in common.

The fire-extinguishing corps of the United States are superior in point of power, *i. e.*, size, number, and capacity of engines, to those of other countries. This is necessitated mainly by the fact that the laws and regulations relative to prevention of fires are less stringent than, for instance, in England, France, and Germany; and, in a lesser degree, by the more rapid growth of American cities, naturally engendering a general spirit of carelessness. There can be no doubt that a very large proportion of the loss by fire in the United States would be prevented by the enactment and enforcement of laws compelling better construction of buildings; imposing proper restrictions upon the manufacture, storage, and transportation of combustible and explosive materials and compounds; requiring searching investigations into the causes and origin of fires, with suitable punishment of persons found guilty of carelessness resulting in fires as well as of incendiaries; and, lastly, by instituting very necessary reforms in fire-underwriting. Neglect of these fundamental principles necessitates the maintenance of large and expensive fire-extinguishing corps, causes great fire-losses, and thus entails a waste of the people's substance. All of these shortcomings may be immediately remedied by legislation except the proper construction of buildings; for the harm already inflicted by faulty construction, permitted or induced by inadequate or improper laws or negligent supervision, is unfortunately of a more permanent nature, and can only be gradually righted. While it is conceded that the vast majority of the large fires and disastrous conflagrations are due to this cause, the lesson taught by this experience and paid for with millions of treasure seems nevertheless to go unheeded. In the absence of these safeguards the efficiency of American fire-extinguishing corps becomes of paramount importance, and that depends upon the character of its personnel, its equipment, and management.

The paid fire-extinguishing corps of the United States are generally organized into companies of from 6 to 12 officers and men each, equipped either with a steam fire-engine and hose-tender or a chemical fire-engine (which are called engine companies); or with a hose-carriage only (called a hose company); or with a hook-and-ladder truck (called a hook-and-ladder company); each apparatus being drawn by horses. Some engine companies are also equipped with a hook-and-ladder truck and additional officers and men, and a water-tower is also sometimes added to either an engine or hook-and-ladder company, with additional men. Most cities are divided into company districts, in which the commander of each fire-company exercises a general control over the fire department material located in it, the fire-alarm boxes, fire-hydrants, etc., and by frequent inspections keeps himself informed as to the enforcement of all laws with the execution of which the department may be charged, and the plan and construction of the buildings. In some of the larger cities the companies are organized into battalions commanded by a chief of battalion, the whole being under the command of the highest officer, who is variously designated as "chief of department," "chief-engineer," or "fire-marshal." In a few of the larger cities the regular firemen, from the highest officer down to the humblest private, are appointed for life or during good behavior, being removable for misconduct only, and are therefore free from the baneful effects of local political changes. In others a "clean

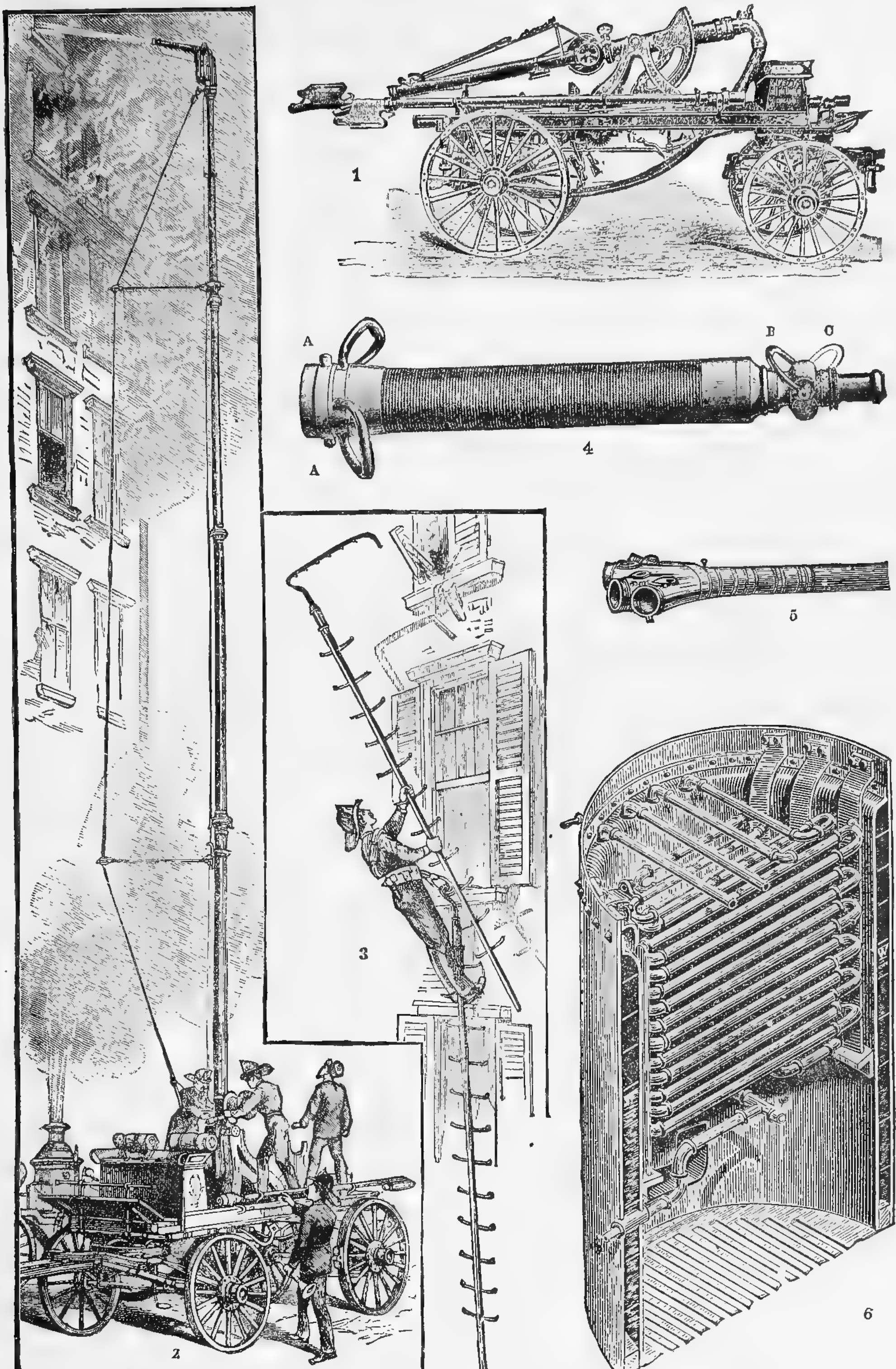


FIG. 1. Portable water-tower at rest. FIG. 2. Water-tower in service, showing brace-line against the recoil; guide-line for directing stream, etc FIG 3 Using the scaling-ladder. FIG. 4. Pipe and cut-off nozzle. (*A*, Grip-handles; *B*, Cut-off open; *C*, Cut-off closed.) FIG. 5. Siamese connection (4-way, with automatic valves). FIG. 6. Internal construction of coil fire-engine boiler.

"sweep," of the higher officers at least, is looked for as a matter of course after each revolution in local politics, and in some places is remorselessly ordered with but little regard to the efficiency of the service. It is needless to say that a high state of discipline and effectiveness cannot be attained in an organization the members of which feel dependent upon the political faction in power for the time, and that the effect of each political change is under such circumstances necessarily demoralizing and destructive of every condition of success.

Permanency in position, dependent only upon good conduct, was first assured to the members of its fire-extinguishing corps by the New York Fire Commissioners in 1867, and simultaneously the system of promotion after qualification before an examining board was inaugurated. So evident was the good effect of these provisions that the principle of a life-tenure was recognized by law in 1873, while the civil service reform legislation has, within the past few years, provided for examination and qualification before appointment or promotion. Physical qualifications had, however, also been required of candidates for appointment in that department since 1867; and in 1883 another important stride in advance was made by the fire commissioners, in requiring that every candidate for appointment or promotion must successfully pass through a course of practical instruction and drill in the use of scaling-ladders, life-lines, and other appliances, recently introduced for life-saving purposes. This is the crucial test, and it may be safely asserted that the candidate who successfully passes this examination possesses, so far as it can possibly be ascertained prior to actual service, all the requisites of courage, nerve, strength, and agility necessary to make a first-class fireman.

The best fire-extinguishing corps are unquestionably those in which these principles underlie the organization, and in which the arduous, wearing, and often very dangerous nature of the fireman's service is acknowledged in the form of liberal pay and provision for retirement upon becoming disabled for active service. Under such conditions the very best service can and should be exacted from the members. In both these conditions the New York department leads. The salaries paid are liberal compared with other cities, though the cost of living is higher and the service is considered to be more arduous. By a legislative enactment in 1871 a relief fund was created, from which pensions are paid to officers and men upon their retirement, or when partially disabled and relieved only from active service at fires but still held for lighter duties. For disability (whether total or partial) incurred in the line of duty, or after 10 years' continuous service, the law allows half pay; if not incurred in the line of duty, and before 10 years' continuous service, one-third pay. To those advantages are added rewards of merit (consisting of endowed medals) for courageous rescues at fires and other acts of heroism, and for general good deportment. The additional requirement might with great benefit be everywhere made, that officers and men should have their homes in the immediate vicinity of their respective company houses, and that transfers interfering with this condition, should not be made. Finally, strict discipline is essential to the effectiveness of a fire-extinguishing corps.

Apparatus.—The steam-fire-engine is the most important apparatus, except in the rare instances where the water pressure is effective for fire-extinguishing purposes without their use. These engines are generally classified according to the construction of the pumps, which are either piston or rotary, and may be either single or double; and as to the construction of the boilers, which are either flue, tubular, or coil, as shown by the accompanying illustrations. The tubular boiler is now made of two patterns, the drop-tube and the nest-tube, the latter being the latest form. Naturally the aim of all manufacturers is to produce engines of the greatest power and least weight compatible with necessary strength and durability. They are made of various sizes, but, as each manufacturer has adopted a classification independent of the others, there is no general fixed standard of size. About the heaviest engines now in use weigh, fully equipped, with water in boiler and men riding upon them, somewhat over 5 tons, while the lightest made to be drawn by horses, under the same conditions, weigh about 2½ tons. Preference is now generally given to a light engine of about 3 tons weight, the heavier ones being used as reserve engines and during fires of long duration. In nearly all of the more important departments the water in the boilers is maintained at or somewhat above the steaming point while standing in quarters, to insure a working pressure on arrival, in case of fire in the immediate vicinity. This is effected by an attachment known as the heater, ordinarily placed in the basement or cellar of the engine-house, consisting of a stove with a coil of pipe through which water circulates and is converted into steam, passing thence through pipes into the boiler of the engine, to which it is connected in such a manner as to permit of instantaneous disconnection upon the sounding of an alarm.

The maximum capacity of the most powerful steam-fire-engines is about 900 gallons per minute; that of the smallest about 300 gallons. A most important improvement in the pumps of fire-engines was the invention of the automatic relief-valve, which enabled the pipe-man to shut off the flow of water at the point of discharge without communicating with the engineer running the engine. By means of this device the pipeman has complete control of the flow of water. The damage to property from the unnecessary use of water, formerly caused by the delays in stopping the engine, is thus entirely obviated.

The means of obtaining water for fire-extinguishing purposes consists principally of hydrants connected with the water-mains in streets, though all engines are also constructed to draw water from streams and other bodies of water, as well as from cisterns, etc., by means of flexible suction-pipes with which they are provided. Fire-hydrants are now placed much nearer together than formerly, especially in important sections of large cities, thereby obviating the necessity of long lines of hose, the consequent loss by friction, and wear and tear of both hose and engines. Fire-hydrants are of two distinctive kinds: the post hydrant, projecting above the sidewalk level, and the flush hydrant, which does not project above the sidewalk or street level, the opening to it being covered by an iron plate appropriately marked. The first named is most used and is of various patterns, while the use of the second is restricted to a few cities only.

The hose-cart or hose-tender is ordinarily built to carry from 750 to 1000 feet of hose upon a large coil, and with seats for 6 of the men. Most of these tenders are two-wheeled and drawn by one horse, but in the larger cities the four-wheeled tender drawn by two horses is now preferred, by reason of its greater carrying capacity and because the two-wheeled tender is too heavy for one horse. All tenders are fitted to carry wrenches and other necessary tools, and in New York some of the four-wheeled tenders also carry short scaling-ladders, for use if required before the arrival of a hook-and-ladder company.

The hose, and in fact nearly every apparatus, implement, and tool designed for fire-extinguishing purposes, should be as light in weight as is compatible with necessary strength and durability. But it is a question whether the quality of durability should be very strongly insisted upon, for if the article has the required strength, and is light and portable at the expense only of great durability, it would be true economy to replace it frequently. The pressure upon hose at fires rarely exceeds 250 pounds to the square inch, and any that will resist a pressure test of 300 pounds applied to a single length, selected at random from a lot, is deemed safe and reliable. It should, however, possess two other indispensable qualities, to wit: that it neither shortens in length nor twists under the test pressure. The hose now almost universally used in large cities is of two general kinds—the rubber or combination, made principally of rubber upon a body of cotton fabric, being both covered and lined with rubber; and the cotton, rubber lined, which is principally of cotton woven cylindrically and rubber lined. The various brands of the rubber or combination hose do not differ in construction as widely as the cotton fabric, which is of two distinct kinds—the ordinary single fabric, and the double or jacket pattern, which may be best described as consisting of a light cylindrically woven cotton hose, rubber lined, with another similar cotton hose without lining drawn over it. The ordinary fire-hose is 2½ inches in internal diameter, but for special apparatus, such as fire-boats, or water towers, and for "Siamesing" or combining two or more streams into one, 3, 3¼, 3½, and even 4-inch hose is made use of. The ordinary 2½-inch hose weighs about 65 pounds per length of fifty feet, inclusive of couplings; the rubber or combination of this weight being 3-ply, by which is meant the number of thicknesses of canvas between the outer coating and the interior lining of rubber; while the thickness and number of strands composing the cotton fabric hose are greater or less, according to weight.

The simplest coupling, the screw, is considered the best, as being the most reliable under all circumstances, though much ingenuity has been shown in devising couplings to lock quicker than it is possible to screw those of the kind first referred to together. As none of these improvements have so far been found to be without objections, rendering them not as positively reliable as the screw coupling, it has been deemed best to adhere to that pattern, at the expense of a little more time at the outset in making connection, but with the absolute certainty that, once properly made, it holds together. It has been the aim for many years past to have a standard coupling throughout the United States, so that, in the event of a conflagration, neighboring fire-extinguishing corps can readily render aid. So far as the larger cities are concerned this has been accomplished, mainly through the efforts of the chief officers of the country assembled in annual convention.

For cities having many high business structures the "water tower" has become an indispensable apparatus. It is in reality a portable stand-pipe, run upon wheels and drawn by horses; the pipe itself is easily and quickly put together in lengths varying in the aggregate from 33 to 51 feet, and is then as easily and quickly elevated to a perpendicular position. The hose supplying the water is attached to the bottom of the pipe or tube, which is made to revolve by a simple gearing, the end or top section having a flexible discharge-pipe with nozzle, which can be pointed at any required angle by means of a wire cord attached to it; and the whole apparatus, when in operation, is under the control of one man standing upon the truck, from which point he is enabled to give the stream any direction. The great advantage of having a powerful and steady stream of water delivered horizontally, or nearly so, and at short range, into the upper stories of a burning building, is manifest. It should be mentioned that the pipe, in whatever direction the water may be delivered, is always braced against the recoil. The accompanying illustrations show the apparatus.

A number of the large cities also have floating-engines or fire-boats, fitted with more or less powerful fire-pumps. The latest addition to this branch of fire-extinguishing equipment is the one built for the city of Brooklyn, which is said to be an improvement on its predecessors in other cities. It is undoubtedly so in furnishing more steam-power, greater speed and facility in turning (having twin screws), more powerful pumps, and greater deck-room. These improvements are made possible mainly by dispensing with the quarters for the crew, usually built upon the deck, which, wherever it is practicable to provide them on shore in the vicinity of the boat's berth, are not necessary. A fire-boat should be built solely with a view to fighting fire most effectually under all possible circumstances. It is therefore requisite not only that it is powerful, swift, and easily handled, but also that it is as nearly fire-proof above the water-line as it can be made, the part of the hull below the water-line being constructed only with a view to securing the necessary strength and the maximum of buoyancy. The majority of fire-boats are built entirely of wood; a few have iron hulls, but all have upper works of wood, and, as a consequence, instead of being able to run close into a fire and deliver their streams at the shortest and most effective range, they are often obliged, if the fire be hot, either to keep away from it and do comparatively ineffectual work, or to devote a considerable part of their effort to protect themselves from burning.

The chemical fire-engine is by reason of its lightness much used in villages and smaller cities, and to some extent in larger cities, in the latter, however, principally in the suburban districts. The best form is the double tank, which enables the recharging of the tank first exhausted while the second is discharging, in that manner securing a continuous flow. These tanks are each from 60 to 100 gallons capacity, and contain a chemical mixture with water producing carbonic acid gas, which generates the pressure (about 125 lbs. at the maximum) necessary to force the mixture through hose about an inch in diameter, and throw it, through a ¼ to ½ inch nozzle, a maximum distance of about 150 feet. Another pattern of this apparatus discharges hydrochloric acid and ammoniacal gases upon the fire by air pressure. These gases are effectual fire extinguishers, but there is much more claimed for their efficacy when employed in this manner than experience proves them to be entitled to, as but a fractional part of the gas generated is carried with the stream and reaches the fire. As the former apparatus furnishes its own discharging force, and the engine possesses the important requisite of lightness and consequent rapidity of movement, and is always ready for instant service (the mixture being also non-freezing at zero), it is for many localities a valuable apparatus.

The portable fire-extinguisher, a cylindrical vessel of about 7 gallons capacity, made to be carried upon the back of a man, is in principle of construction and operation like the chemical fire-engine, and uses the same mixture. It throws a stream of about ⅛ of an inch diameter about 30 feet, for about 8 minutes. In the hands of a cool person it is capable of effective work, though necessarily its field of usefulness is circumscribed. But its importance and effectiveness in the hands of the inexperienced have been much exaggerated. A bucket of water is generally quite as good for extinguishing a small or incipient fire. It often happens, too, that from want of care and disuse the extinguisher is out of order and useless when needed. Firemen employ it to good advantage, after the large streams have done their work, in extinguishing the remnants of fire.

The hook-and-ladder truck, as now built and equipped, is made to carry ladders of various lengths, ranging from the shortest of 10 feet to the longest single ladder of 45 feet, and an extension ladder, which, when fully extended, is about 83 feet in length. Hooks, at the end of stout poles, of various lengths, 6 to 20 feet, axes, pick-axes, forks, shovels, a battering-ram, tools for prying open heavy doors and the like, scaling-ladders, life-lines and belts, fire-extinguishers, are also carried upon this apparatus. In the manufacture of the best fire-ladders great care is exercised in the selection of the timber, second-growth spruce or Oregon pine, entirely free from knots and other defects, which has been weather-seasoned (not kiln-dried), being the preferred material. A fully equipped large hook-and-ladder truck weighs about 8000 pounds, and is drawn by two horses. Its great length of 51 feet necessitates the tiller, attached to and situated over the hind axle, which turns the rear of the truck in either direction, in going around street corners, etc. The apparatus is about 8 feet high, and great care and experience is required on the part both of the driver and tillerman to prevent collisions and other accidents. Most of the long ladders each rest upon rollers in the frame of the truck, and are so placed that either can be taken out without unloading those placed above it.

Though they may not be charged by law with saving human life at fires, it is a duty voluntarily assumed by fire-extinguishing corps in the United States, and many of the appliances carried upon the improved hook-and-ladder trucks and elsewhere are mainly useful for that purpose. First among them is the scaling-ladder, of which illustrations are herein given. There is no limit to the height at which a scaling-ladder can be used, provided there are windows or other openings into which its hook can be inserted. Its great importance will be readily understood when it is stated that 14 per cent. of the buildings in New York city, at the close of 1885, were of such a height that the windows of the top floors could not be reached with the longest extension ladders in use. In the hands of active, courageous, and well-trained men the scaling-ladder is a most valuable appliance for life-saving as well as for ordinary work at fires. In New York city over one-half of all the officers and men of the fire-extinguishing corps have received thorough training in this important branch of the service; and though the large majority of them may never be called upon to apply the training thus acquired in rescuing human beings at fires, it has made them better firemen for the ordinary work they are called upon to do. To St. Louis belongs the credit of being the first American city to adopt these methods, and a few others besides New York have since followed the example.

The "jumping-sheet," designed to catch persons falling or jumping from a height at fires, which is employed as a last resort in life-saving, is ordinarily made of canvas with rope handles along the edges for holding it stretched out. A circular rope-net about 15 feet in diameter is the pattern now carried upon the tenders and hook-and-ladder trucks of New York.

To hoist lines of hose upon high buildings is a very laborious process by the primitive method now all but universally in vogue, which is to pull it up with a roof rope by main strength. An officer of the New York Fire Department has recently made a "hose-hoister," which has proved a success. It consists of a frame with two rollers, upon which the rope runs, and is so shaped that it readily adjusts itself to a projecting cornice or the plain coping of a wall. It effects a saving of time, labor, and wear and tear, and has also been utilized in hoisting ladders to roofs.

Apparatus Houses.—In the modern apparatus house of a large fire department everything is made subservient to the requirements of the service. The ground floor is occupied mainly by the apparatus and horses; the former stand with tongue or shafts, as the case may be, towards the street doors and with the harness suspended over them; the latter also face towards the street and stand in stalls along the side walls, opposite the wheels of the apparatus. The telegraph machinery is located at the side and near the street entrance. The basement or cellar is devoted to the storage of fuel, and in engine-houses the heater for maintaining steam-pressure in the boiler of the engine is there located as previously explained. The second floor is occupied as officers' quarters and dormitory, bath, etc. Upon the third floor is the sitting-room for the members (if the size of the house does not admit of its location on the first or second floor), and this floor is also used for men's clothing lockers, the storage of horse-feed, etc. In engine-houses, in lieu of the hose tower built upon the roof over the hose shaft, which is ordinarily located at either side of the building and near its front, a fourth story is now added to the front of the building, extending back from 20 to 25 feet. The hose shaft is for the purpose of hanging the hose not in use at full length, and serves the double purpose of thoroughly drying it and straightening it out after use. One or more poles connect the several stories with each other through openings in the floors, which are used for sliding down on when alarms are received.

In some cities two companies, an engine and a hook-and-ladder company, are located together. This is not desirable, for the reason that two companies located apart cover more territory in the same space of time. If time was not so important a factor in fire-extinguishing in American cities, a concentration of apparatus at a central point, as is the case in some European cities, would not be so objectionable. Apparatus houses are also located where possible in the centre of the most dangerous districts.

In choosing a site for a company, due regard is also had to the height of the location, so that in responding to alarms from any direction the ascent of hills may be avoided. Locations in hollows, or at the base of steep acclivities, are therefore not chosen.

Uniforms.—The uniform of the firemen should be neat, and, above all, serviceable and convenient. The dark blue in use by most paid departments is perhaps the best as to color, and the white metal button, for all below the grade of officers at least, seems most appropriate. The cut of the usual standard fireman's uniform is also proper, with the exception of the overcoat, the long skirts of which certainly interfere with and impede the free motion of the firemen. They are of course, rarely purposely but often perforce, worn at fires, and should be cut with short skirts or sack pattern to secure the utmost freedom of motion. Rubber coats, leggings, and boots are clearly a necessity, as well as the fire-cap of leather with its ribbed conical top and peculiar brim to protect the head. For the latter a helmet has been suggested as a substitute, but while perhaps more pleasing in appearance it affords hardly as much protection.

Horses.—A good fire-horse possesses many qualities of excellence, such as strength, speed, intelligence, and alertness. In size and weight they average 16 hands and 1300 pounds. The ordinary heavy draught or truck horse usually lacks some of the other requisites and is not suitable for fire purposes. In the New York Fire Department horses are taken on trial at the risk of the dealer, and are first sent to a training stable where they are accustomed to the sound of the telegraph alarm gong, the hitching with the various kinds of harness in use, and are driven before an apparatus. They are next sent for trial in active service to a company, and if the reports of both tests concur in showing them to be in every respect suitable for the service, they are purchased and receive a registered number, which is stamped upon a seal of lead, fastened to a round leather strap worn around the horse's neck. This serves to identify the horses, though a descriptive record of each horse is also kept. Some horses can be trained to stand unfastened in their stalls, but the majority are fastened with a halter strap by means of a bolt in the side of the stall which passes through a ring in the end of the strap. The first stroke of the gong withdraws the bolt and the horse is released. Horses, like men, though rigidly examined at the time of entering the service, frequently develop disease of the heart as a consequence of the exciting duty they are called upon to perform, and sudden deaths from that cause often occur. The average length of service of horses in the New York Fire Department is 6 years, and the age at which they are purchased varies from 4½ to 6 years. As a matter of course, a horse, though becoming unfitted for active fire-service, may still be useful for other purposes, and the policy therefore is to sell them as soon as it becomes apparent that their usefulness for the former is waning.

The harness for teams is, with the exception of the headstall (which is worn by the horses continuously), suspended from the ceiling over the tongue of the apparatus, with the traces attached to the whiffletrees, so that, when the horses run under it, it is only necessary to snap the hinged collar together around the neck, to snap the pole chain and two reins, in all four snaps for each horse, while a simple jerk upon the reins from the driver's seat detaches the entire harness from the rig by which it is suspended. For one-horse apparatus the harness is arranged over the shafts, the ends of which are elevated so as to allow the horse to run under them, and the attaching of the two rein snaps, with the collar and the belly-band snaps, completes the hitching process. This is not merely a time-saving process, but a saving in horse-flesh and harness, compared to former methods.

Fire-alarm Telegraph.—The telegraph is in American cities an indispensable branch of the fire-service. Without the means of promptly furnishing information of the locality of fires which it affords, other more expensive and yet less effective methods would have to be employed, involving a considerable increase of the fire-extinguishing force, men and apparatus. The ordinary system consists in a central office, generally located at the head-quarters of the department, with metallic circuits radiating thence in all directions, and street boxes connected therewith, located at from two to six blocks or squares apart. Where practicable the circuits are so run that contiguous boxes are connected with different circuits, so that if one circuit is at any time out of order the nearest box will not be affected.

The majority of the boxes are of the locked door pattern, keys to open them being placed in prominent buildings in the immediate vicinity, and are also carried by firemen and policemen. In New York any reputable citizen can also have a key to be carried on the person, and a considerable number of them have been issued with very good results. All keys are registered by number and series. The locked door is, however, in New York, Chicago, Boston, and St. Louis, rapidly being replaced by the keyless door, which is opened by simply turning a handle. In this door, which is made double, is placed a loud gong with a striking mechanism, wound up by turning the handle in opening the door, thus sounding a local alarm and attracting the attention of persons in the vicinity. The gong continues to sound for about 5 seconds after the door is opened, and is intended to prevent interference with the boxes. In New York, where, before the introduction of the keyless door, much trouble had been experienced by interference with the locked-door boxes, the former has proven in every way satisfactory. It is manifest that an open box, accessible to all, from which an alarm can be sent without a key, the search for which necessarily sometimes results in delay, is a most valuable improvement. The street fire-alarm telegraph boxes principally in use do not differ materially in interior construction and mechanism. The one most used has an interior locked door upon which the hook or slide, by means of which the alarm is sent, is placed, so that, in the case of a box having either the locked or keyless door, it is necessary, after opening the outer door, to pull down the hook or slide upon the inner door to send the alarm. The inner door is opened by means of a key usually intrusted only to officers of the fire-extinguishing corps and telegraph employés, and inside of it is a Morse-key for use in sending second and third alarms and special calls. This inner-door key is also used in New York for releasing the key used in opening the outer door in locked boxes, the locks in which are so constructed as to prevent the withdrawal of the key after it has been turned in it, without the use of the inner-door key.

In addition to the box-circuits there are other circuits devoted exclusively to the transmission of alarms and other signals from the central office to the company houses, etc., in which they are sounded upon large gongs, and there are also so-called talking circuits (now telephonic in most cities), over which all except the first rounds of an alarm received at the central office are, by means of a lever switch, sent to the various apparatus houses, in advance of the regular gong circuit, signal and sound upon a small gong. This is popularly known as the combination, and is relied upon to such an extent as to almost entirely supersede the large gong circuit, when both are in working order.

New York has connected with its street fire-alarm telegraph system what is known as the special building system, under which any building can be connected directly with the central office for fire-alarm purposes, by means of a metallic wire loop running from a box circuit to the building and connected with an alarm-box therein. The expense of this is borne by the owners. All of the theatres and the public schools are thus connected, the latter having facilities for sending for the police and ambulances additionally. There is also in that city a private corporation which furnishes an automatic system of communicating alarms for fire by means of thermostats connected by wire and set to send an alarm when the temperature surrounding it attains a certain fixed degree. The alarms received by this company are also received and responded to by the fire department; and though the proportion of unnecessary alarms received by this method is very large, and there have been some instances of its entire failure, it has in a number of cases proved of great benefit in giving early notice of fires.

Service at Fires.—The usual system of assignments of companies to duty at fire-alarm stations is in the order of the proximity of their quarters to them. This, in case of large fires requiring the service of many companies, results in leaving large sections unprotected to such an extent that in case of another fire occurring therein it would be necessary to summon companies from a considerable distance, thus incurring the proverbial dangers of delay. Attempts have been made to remedy this in two ways: the first, by calling distant companies, one by one, to temporarily locate in and protect the denuded districts; the other expedient is the "double company," which is equipped with a duplicate set of apparatus, horses, and hose, and has its force of officers and men increased 50 per cent. The double company is divided into two sections for fire-duty; the first being held in instant readiness for service, and is replaced by the second when it responds to an alarm, which in turn then responds to any subsequent call for the company. It has been suggested that a modification of the system of assignments would overcome the difficulty without additional expenditure. This in brief is, that where now, for instance, engine-companies Nos. 1, 2, and 3 are assigned to a certain station on first alarm, Nos. 4, 5, 6, and 7 on second alarm, and Nos. 8, 9, 10, and 11 on third alarm (all being placed in the order of their proximity to the station), the last one assigned on each alarm is taken out and held in reserve, the others being moved forward to take the vacant places; thus, first alarm, 1, 2, and 4 (3 in reserve); second alarm, 5, 6, 8, and 9 (7 in reserve); and third alarm, 10, 12, 13, and 14 (11 in reserve). The same principle, though necessarily limited in scope, is applicable to hook-and-ladder companies.

Upon the sounding of an alarm signal the entire company, men and horses, are instantly roused into activity, though at the time the house watchman may be alone on the apparatus floor. The horses rush to their places, the men slide quickly down the poles from the upper floors, and before the gong has ceased striking the first round (unless it be a very short signal), the horses are hitched, the doors opened, the men mounted upon the apparatus, and the company is ready to start, as soon as it is known by the completion of the signal whether it is to proceed to the station indicated or not. If it is, the company is off for the scene of the fire by the shortest or most practicable route. The operation, up to the crossing of the curb in front of quarters, consumes about 15 seconds of time from the first stroke of the gong, and, if it be an engine, the torch has already been applied to the carefully prepared fuel in the furnace, and when the apparatus has travelled a few blocks the steam-gauge indicates a working pressure.

No time is lost upon arrival at the fire; the engine is directed to the nearest hydrant, and attaches to it; the tender connects its hose to the engine, and reels off a sufficient quantity in the direction of the fire; the company commander who arrives first assumes command of the whole force until relieved by a chief officer; ladders are raised if required, doors are battered in, iron shutters opened, and lines of hose are carried into the burning building, up ladders or stairways, or down into basements and sub-cellars, in search of the seat of the fire. Smoke is generally first encountered, through which the firemen fight their way, blinding and stifling though it be, in their efforts to reach the point from which they can do effective work and reach the body of the fire with streams of water. The respirators and other contrivances to relieve the firemen from the effects of smoke have proved of little use. The hardest work is generally done out of sight of all except the officers, who are at the front aiding and guarding the safety of their men; and it is not easy for those who have not had the experience to fully appreciate the exhaustive nature of this service. Many a fire is stubbornly fought for hours in dense and suffocating smoke and heat, while hardly a tongue of flame is visible to the spectator. The approved modern method of fighting fire is always, where practicable, to attack it inside the burning structure and at the shortest possible range. In the vast majority of cases these tactics are successful; but it sometimes occurs that the firemen are driven from their first position to another, and, in rare cases, at once, or step by step, to the street. Though accustomed to face danger in many forms firemen are naturally not exempt from becoming panic-stricken, though seldom without justifiable cause. They are even then, however, readily controlled, and under competent and courageous leadership often quickly recover the lost position, and finally conquer the fire. There are also instances where the fire has already attained such headway when the fire-extinguishing corps arrives that the experienced officer sees at a glance that the burning structure is doomed to destruction, and determines that all the energy of the corps must be exerted to prevent the extension of the fire to the adjoining or neighboring property.

For the efficient carrying on of the work of the fire department in large cities, a classification of the structures in each district is essential. In New York three general classes are recognized: (1) The so-called fire-proof buildings; (2) Buildings principally of non-inflammable materials, but with wooden beams, floors, etc.; (3) Buildings chiefly of wood. They are further classed according to use, whether for residence or for business, or partly for each purpose, etc. (C. J.)

FIRE-WEED. The *Erechtites hieracifolia*, a coarse American herbaceous plant of the order Compositæ, is called fire-weed from its vigorous growth on ground which has been burned over. When it has to struggle with other species of vegetation it is often not more than a few inches high, though it perfects seeds and perpetuates its race unnoticed; but after a fire it grows with very remarkable luxuriance. Hence rustic observers often believe it is wholly created by the fire. It usually reaches three and sometimes five feet high under these conditions. Its decoction has been found serviceable in dysentery. In the time of Linnæus it was classed with the groundsels, well-known composite plants of the genus *Senecio*, and was called *Senecio hieracifolius* by that eminent botanist. Its general appearance is more like a sow-thistle—*Sonchus*, though its botanical characters are much like *Senecio*. Rafinesque, in the *Flora Ludoviciana*, first separated it under the name of *Erechtites*. The flowers are all tubular (in *Senecio* generally radiate); those of the margin pistillate, of the disk perfect, involucre cylindrical, simple, slightly calyculate; receptacle naked; pappus of numerous, fine, capillary bristles. The involucre is comparatively large and turned at the base. Fire-weed in the north is very often *Epilobium angustifolium*, which, like the *Erechtites*, springs up in immense quantities, clothing the whole surface very soon after a fire, and giving even by its bright rosy flowers an igneous character to the scenery. (T. M.)

FIRKOWITSCH, ABRAHAM (1786–1874), a Jewish archæologist, was born at Lutzk, in the Crimea, Sept. 27, 1786. He belonged to the Karaites, and became a rabbi. After his sect established a printing press at Eupatoria in 1825 for the reproduction of manuscripts and works in support of Karaite teaching Firkowitsch became the leader in gathering documents for this purpose. He gave some account of his labors in *Massa u-Meriba* (1838) and in *Abne-Likkaron* (1872). After he had gathered more than 15,000 Hebrew manuscripts, Biblical, Talmudical, and other, he took them to St. Petersburg, where they were purchased for the imperial library. He also published several remarkable inscriptions which he professed to have discovered in the cemeteries of his sect. These and others of his publications tended to carry its antiquity back several centuries. At last the orthodox Jews were roused to investigate his claims, and soon succeeded in proving that many of his documents were untrustworthy and that some were absolute forgeries. Before this was established, however, Firkowitsch died at Tshufut-Kale, in the Crimea, June 7, 1874.

FISCHER, ERNST KUNO BERTHOLD, a German philosopher, was born at Sandewalde, Silesia, July 23, 1824. He was educated at Posen and Leipsic, and finally graduated at Halle in 1847. His lectures on philosophy at the University of Heidelberg began in 1850, but in July, 1853, his license to teach was revoked by the government of Baden. He remained, however, at Heidelberg until 1855, when he removed to Berlin. In September, 1856, the King of Prussia, on the request of the faculty of the Berlin University, granted him permission to lecture, but he went to Jena as professor of philosophy in December. His lectures were attended by a larger concourse of students than had ever been known since the time of Schiller and Fichte. In 1862 the Grand Duke of Weimar gave him the rank of privy councillor. In 1872 Fischer accepted a call to Heidelberg, where he has lectured with the same success as at Jena.

As a philosopher, he belongs to the school of Hegel, but he has been especially noted for his brilliant expositions of the schools and leaders of modern thought. His first work, *Diotima, Die Idee des Schönen* (1849), was a development of the principles of æsthetics, according to the Hegelian school. More important was his *Logik und Metaphysik, oder Wissenschaftslehre* (1852), which was a further exposition of the doctrines of the same school. His chief work is his *Geschichte der neuern Philosophie*, which began to appear in 1852, and after various revisions was completed in 1882. It includes a series of monographs on Descartes, Spinoza, Leibnitz, Kant, Fichte, and Schelling. He has also published *Francis Bacon und seine Nachfolger* (1856), and works on Schiller and Lessing, on Goethe's *Faust* and Shakespeare's *Richard III.* J. P. Mahaffy has translated and edited his *Commentary on Kant's Critick of the Pure Reason* (1866).

FISH. The general subject of Fish is fully presented under ICHTHYOLOGY in the ENCYCLOPÆDIA BRITANNICA, but Food-Fishes, being worthy of separate discussion, are here treated. By far the greater part, if not all, the backboned, cold-blooded inhabitants of the rivers and seas are fit for human food, yet for various reasons only a limited number are taken for that purpose in sufficient quantity to merit the title of food-fishes. Very small fishes, such as sticklebacks, are not usually fished for, and there are many fishes which, although they attain a larger size, seem to be almost entirely head, skin, fins, spines, and scales. There is a popular prejudice against many fishes, some of which are reputed poisonous, while others are loathed because of their hideous aspect or power to inflict wounds. A further large deduction must be made for the species which are too rare, or at least too seldom met with, to furnish material for a fishery.

There seems to be no doubt that persons have occasionally been poisoned by eating fish, and certain kinds seem to have a bad pre-eminence in this direction, yet it may fairly be doubted whether the flesh of any fresh and healthy fish is ever poisonous. Certain subtle chemical poisons, called "ptomaines," develop in the flesh of animals that have been killed, and fish are often kept too long. It must also be remembered that we know nothing of the diseases of fish. The flesh of diseased cattle is usually not eaten, but the flesh of fishes is partaken of indiscriminately. Thus there is, on the whole, more risk in a diet of fish than in one of flesh.

The tribes which furnish the chief food-fishes are the Salmonidæ, or salmon, trout, and whitefish family; the Gadidæ, or cod, pollock, and whiting family; the Clupeidæ, or herring and shad family; the Pleuronectidæ, or turbot, sole, and flounder family; the Scombridæ, or mackerel; and the Cyprinidæ, or carp and roach family. Less important, yet still supplying many food-fishes, are the Siluridæ, or cat-fish tribe; the Anguillidæ, or eel tribe; the Mugilidæ, or mullets; the Percidæ and Serranidæ, perch and sea-perch; the Sparidæ, snappers, porgies; the Sciænidæ, drum-fish, sea-bass; the Labridæ, Scorpænidæ, etc. Sharks and skates are also eaten, especially by the poorer classes, while the oil, skin, or shagreen, and fins of some of them are articles of commerce. Sturgeons are eaten in all countries, but the repute in which they are held varies greatly.

The food-fishes of the world are beyond treatment here, but the principal species caught in the rivers and on the coasts of the United States are as follows.

Lampreys, often called lamprey eels or even eels, are sometimes eaten. They may be easily known by their round, sucking mouth and by the seven small gill-openings on each side of the body behind the head. Like salmon, they ascend the rivers (usually in spring) to deposit their spawn.

Among the rays those most often used for food belong to the genus *Raia*. All rays have huge pectoral fins, extending along each side of the body, which forms with it a flat disk, from which the hinder part of the body projects as a comparatively thin tail. In *Raia* the pectoral fins are not continued around the snout, as they are in some other rays, and the tail has two dorsal fins.

The dog-fish, or picked dog-fish (*Squalus acanthias*), is a small shark with a strong spine in front of each of its dorsal fins. Dog-fish oil is obtained from its liver, as it is also from those of *Galeorhinus galeus*, the oil-shark of the Pacific coast.

The sturgeons and their relatives are large fishes with a partly cartilaginous skeleton, a shark-like or heterocercal tail, and the mouth placed, as in sharks, upon the under side of the head. Most of them have no teeth, and the skin is either smooth, as in the paddle-fish, or beset with spinous bony plates. The paddle-fish (*Polyodon*) of the Mississippi Valley and rivers of the Southern States attains a length of five or six feet, and has its snout lengthened into a thin flat blade. Its mouth is set with fine teeth, and it has no barbels and no tongue. The true sturgeons (*Acipenser*) have a much less produced snout, five rows of bony bucklers on the body, each bearing a spine, no teeth, and a small mouth with thick lips, preceded by a row of four barbels on the under side of the snout. The two best known American species are *Acipenser sturio*, the common sturgeon of both shores of the Atlantic Ocean, and *A. transmontanus* of the Pacific coast. The latter species attains a length of nine or ten feet and a weight of 600 pounds. It ascends the Sacramento, Columbia, and Fraser Rivers in large numbers in spring. Its flesh is used both under its own name and as "sea-bass" and "tenderloin of sole" and its eggs are made into caviare. A somewhat smaller sturgeon of the Pacific coast is the green sturgeon, which, perhaps from the tint of its flesh, is reputed poisonous and is not eaten.

The Mississippi and its affluents, the great lakes and other fresh waters, are frequented by the black or lake sturgeon (*A. rubicundus*), which weighs from 50 to 100 pounds, and seldom descends to the sea. The shovel-nose sturgeon has a broad, shovel-like snout, and the tail is entirely mailed. It is common in the Mississippi Valley and in the rivers of the Southern States.

Very strange fishes are the gar pikes of the lakes and large rivers of the United States, with their bodies covered with hard, enamelled, diamond-shaped scales, running in rows obliquely backward across the body, and their long jaws set with many teeth. The long-nosed gar reaches a length of 5 feet, while the great alligator gar, which ranges from the Southern States to Cuba and Central America, attains 8 to 10 feet.

About 30 species of cat-fishes inhabit the waters of the United States, and of these two only are marine. Among those most used for food are the mud cat or yellow cat of the Mississippi Valley and Southern States, a fish which reaches a weight of from 50 to 75 pounds; *Amiurus catus*, the bull-head, horned pout, or cat-fish of the Schuylkill and most rivers and ponds of the Eastern States; the darker *Amiurus melas*, and two species of *Ictalurus* or channel cats. The Schuylkill cat-fish has been introduced into California, where it has rapidly multiplied, and also into some European countries. The great fork-tailed or Florida cat-fish (*Ictalurus lacustris*) reaches 100 pounds, and is abundant in all large bodies of water from British America to Florida and Texas, while the still larger *I. ponderosus*, or great cat-fish of the Mississippi, reaches 150 pounds. The channel cat-fish (*Ictalurus punctatus*) reaches a length of 2 or 3 feet and a weight of 15 to 20 pounds, but individuals exceeding 5 pounds are rare in the markets. The skin is thinner than in the common cat-fishes (*Amiurus*), and as the head is small and the body slender, there is less waste, while the flesh, when fresh, is very superior, being inferior only to the white-fish and trout and salmonoids generally.

The channel cat abounds in all flowing streams from western New York to Montana and southward to Florida and Texas. It seems, unlike others of its tribe, to prefer running waters. It is less tenacious of life than the *Amiuri*.

The cat-fishes and their numerous relatives, which swarm in South America and Africa, principally in fresh water, form the first order of a sub-class of bony fishes which have the air-bladder (if present) opening into the gullet, the ventral fins placed far back (on the abdomen), and the scales (as a rule) smooth-edged or cycloid. The next order consists of fishes which have no teeth in the mouth, but are furnished with comb-like teeth on the pharyngeal bones. The principal families are the fresh-water Cyprinidæ and Catostomidæ, containing many species that are used for food and a few that are highly prized. Nearly 60 species of the latter family inhabit the waters of North America. The mouth is directed downwards and usually has fleshy lips. The species are known as fresh-water suckers, and are not very highly valued as food. Those known as buffalo-fishes are natives of the Mississippi Valley. One species reaches a weight of 30 pounds. Five or 6 kinds of suckers (*Catostomus*) occur in California; Utah Lake has 2, and Arizona has 2 or 3 others. The genus *Chasmistes* has 2 species in the Klamath River and 1 in Utah Lake. The greater part of our fresh-water fishes belong to the Cyprinidæ. About 260 species of this tribe are given in Jordan and Gilbert's *Synopsis*, and others have since been described. The great development of the river and lake systems of North America has given opportunity to these fishes to develop into many more or less distinct forms, many of them restricted to limited areas. The smaller species are known as minnows, red-fins, and shiners; the larger as dace, chub, roach, bream, carp, etc. The fish known by these names are not specifically identical with those which bear these titles in Europe, except in the case of the carp, which are the European species introduced.

The largest of our native Cyprinidæ are Californian, and on account of the form of the head are commonly known as "pike." *Ptychochilus oregonensis* reaches a length of from 3 to 5 feet, while *Mylopharodon robustus* attains 18 inches. The species of Cyprinidæ which occur upon the Pacific coast are comparatively few (about 30) in number, but most of them are sufficiently large to be available as food-fishes. A large number of species inhabit the Gila and Colorado rivers, and the small lakes of the Great Basin are well provided with forms peculiar to them. The most important Cyprinidæ as food-fishes are, however, the two kinds of introduced carp, *Carassius auratus*, the Crucian carp, and *Cyprinus carpio*, the true carp, especially the latter. (See FISH-CULTURE.) The carp has been an object of culture for many generations, and in its domesticated state is generally acknowledged to be a fine fish for the table. The most highly prized varieties are the scaleless or "leather" carp and the "mirror" carp, which is only partly covered with scales.

It is uncertain whether the original home of the carp is the Caspian or whether it originally belonged to the Danube, Rhine, and Main, but it was known to the Greeks and Romans, and has spread throughout Europe. England received it in 1521, Prussia in 1769, Denmark in 1560. Since 1877 a number, especially leather and mirror carp, have been sent to America by the German fishery association. In 1881 they were introduced into Canada, in 1882 into Brazil, Columbia, and Ecuador. Carp seem to increase faster in America than in Germany, growing 3 to 4 pounds in weight every year.

Nearly allied to the herrings or Clupeidæ are the lady-fish (*Albula conorhynchus*), a native of all warm seas and sparingly met with in California; the moon-eyes or fresh-water herring (*Hyodon*), of the fresh waters of the Eastern and Central States; and the Elopidæ or big-eyed herrings. *Elops saurus* is a handsome fish some 2 feet long, not rare on the Atlantic coast, while its near relative, *Megalops thrissoides*, attains dimensions exceeding those of a large salmon. This fish, usually called the Tarpum, and by the French the Grande Ecaille, ascends rivers, is common on the southern coasts of the Atlantic, and is remarkable for the great size of its scales. It is also famous for its propensity to spring from the water when attacked, a habit which renders its capture with hook and line a difficult feat. About eight species of the herrings occur on our coasts, viz.: the common herring (*Clupea harengus*) of both shores of the Atlantic, the young of which is known as whitebait; the California herring (*Clupea mirabilis*); the California sardine (*C. sagax*); the Ohio shad or skipjack (*C. chrysochloris*); the hickory shad (*C. mediocris*); the alewife (*C. vernalis*); the glut herring or blue-back (*C. æstivalis*); and the highly valued shad (*C. sapidissima*). The skipjack and alewife, as well as the shad, enter fresh waters. The menhaden or mossbunker (*Brevoortia tyrannus*) ranges the ocean from New England to Brazil, and is largely used in the manufacture of fish-guano and oil. The young are canned as sardines. All the true herrings have the belly sharp-edged and protected by a series of large bony scales. The anchovies (*Engraulidæ*) are near the herrings, from which they may be known by their relatively large mouth overhung by a bony snout. Three species occur on the Pacific coast and 3 on the Atlantic coast. The anchovy is made in Europe into a sauce for flavoring other fishes, but the American species are neglected. *Synodus fœtens*, the lizard fish, is occasionally found in the markets of San Francisco.

The salmon family contains the most important of food-fishes, except, perhaps, the Gadidæ or cod tribe. Out of about 125 species some 40 are North American. From the herrings all may be known not only by the rounded section of the belly, but by the presence on the back, behind the true dorsal fin, of a small fat-fin without fin-rays. The greater number of Salmonidæ are either natives of fresh water, or are anadromous, coming up from the sea to spawn in the river of their birth. The capelin (*Mallotus*) is a boreal marine species, occurring in New England and Alaska, as well as at intermediate points. The eulachon or candle-fish, of the coast of Oregon and Alaska, is so oily that when dried it will burn like a candle. It ascends the rivers in enormous numbers, and is highly prized as a pan-fish. The smelts (*Osmerus*) are represented by a common species on each of our ocean coasts; for though some still more common fishes of another family have in California usurped the name of smelt, a true smelt is found from San Francisco northward. The surf-smelts (*Hypomesus*) are excellent little firm-fleshed species of the Pacific coast. The genus *Coregonus* furnishes us with eleven kinds of white-fish, all of them confined to fresh waters. The eggs are smaller than those of salmon and trout, and the flesh is usually pale. One species is peculiar to the Rocky Mountain and Pacific region, while most of the others are found in the Great Lakes, three or four of them extending north-westward to Alaska. The black-fin (*C. nigripinnis*), one of the largest species, is confined to the deep waters of Lake Michigan. The grayling (*Thymallus signifer*) occurs on the northern borders of the United States, and thence to the Arctic Ocean.

The salmon of the Pacific coast belong to a genus (*Oncorhynchus*) distinguished from the true salmon by the greater length of the anal fin, and by the long and hooked jaws acquired by the adult males. Although all the five species are used as food, the salmon *par excellence* of the Pacific coast is the one which was becoming familiarly known as the *quinnat*, but has, by a too methodical ichthyologist, had its more ancient name of *chouicha* or *tshawytscha* restored to it. This is the species so extensively canned on the Columbia (see FISHERIES), where it usually reaches a weight of 22 lbs. Individuals of 70 to 100 lbs. have been taken. It is abundant in all the large rivers of the North Pacific from Ventura River, Cal., to Alaska and Northern China. The day salmon (*O. keta*) does not exceed 12 lbs., and spawns much nearer to the sea than the *quinnat*. The blue back (*O. nerka*) weighs 4 to 8 lbs., and in the fall is often found in mountain lakes, where it is known as the red-fish.

The most important well-marked forms of true salmon and trout are the rainbow trout or California brook trout (*Salmo irideus*), now introduced into Europe; the steel-head or salmon trout (*S. gairdneri*), probably identical with the Rocky Mountain trout (*S. purpuratus*), a variety of which is found in Lake Tahoe, Cal.; the mackinaw or great lake trout (*S. namaycush*), a lake species; the Dolly Varden trout of California and Alaska, red-spotted (*S. malma*); and the eastern brook trout (*S. fontinalis*). Besides these there is the well-known and highly valued true salmon (*S. salar*) of both coasts of the North Atlantic, with its lake-dwelling variety (*S. sebago*), the land-locked or Schoodic salmon. The pikes (*Esocidæ*) are a small family of voracious fresh-water fishes. One, the true pike (*Esox lucius*), is common to the northern parts of both the old world and the new, and reaches a length of from two to four feet. The still larger muskallunge (*E. nobilior*) lives in the great lake region and northward, and grows from four to eight feet in length. The three other species are known as pickerel.

The muræna and eel families are not represented by many species in North America, but the abundance of the common eel (*Anguilla rostrata*) of the Atlantic coast in all the streams from Maine to Mexico, and also in the Mississippi Valley, atones for this. The Conger eel (*Conger niger*) is common to both coasts of the Atlantic, while the Conger eel of the Pacific coast is a muræna (*M. mordax*). It reaches a length of five feet, has very large teeth, and is noted for its ferocity.

Until very recently it was believed that the common eel was hermaphrodite, but it is now known that the male eels are smaller than the female, and have the head somewhat differently formed. Microscopical examination of certain organs in these smaller adult eels leaves no doubt that they are truly the male generative glands.

We now arrive at the large sub-class *Physoclisti*, in which the air-bladder, if present, is entirely closed, while the ventral fins are usually placed close to, or even in front of, the pectorals, and the dorsal and anal fins consist to a greater or less extent of spines.

The gar-fish family (*Scomberesocidæ*) includes also the flying fishes (*Exocetus*). Some of the species of gar-fish reach lengths of three or four feet, and are marketable fishes.

Three species of mullet (*Mugil*) occur on our coasts. One of these (*M. brasiliensis*) is found in both oceans. The most important as a food-fish is *M. albula*, the striped mullet, which is very abundant southward on the Atlantic coasts. To the *Atherinidæ* or silversides belong the California smelts, two species of which attain respectable dimensions, and are excessively abundant on the Pacific coast.

The barracudas (*Sphyrænidæ*) furnish four food-fishes, the chief of which are *S. argentea* of the Pacific coast, and *S. picuda* of Florida and the West Indies. These are almost cylindrical, voracious, swift-moving, pike-like fishes, from three to three and a half feet long.

The great sword-fishes (*Xiphiidæ*) are the objects of a regular fishery. The common sword-fish of the Atlantic and Pacific has no ventral fins, nor any teeth, its long sword serving as its weapon of offence and defence. The spear-fish (*Tetrapterus*) and the sail-fish (*Histiophorus*) have ventral fins and small teeth, and the latter has a very high dorsal fin. The mackerel tribe is allied to the sword-fishes, and contains a considerable number of oceanic fishes, the most important of which is the common mackerel (*Scomber scombrus*). This beautiful fish is abundant on both coasts of the North Atlantic, and occasionally strays into the Pacific. Even more valued are the species of *Cybium* or *Scomberomorus*, commonly known as Spanish mackerel. One of these (*S. maculatus*) is found on the North American coasts of both oceans, though it does not appear to occur north of Lower California in the Pacific, while another, *S. concolor*, is a rare and valued fish of California. The Sierra (*S. caballa*) is found in the warm parts of the Atlantic, and occasionally on our coasts. It reaches a weight of 100 lbs. The Spanish mackerel are almost scaleless. A species of bonito (*Sarda*) occurs in the Atlantic and Mediterranean, another on both coasts of the Pacific. The albicore (*Orcynus alalonga*) is abundant in all warm seas, and though rare on the Atlantic coast, is frequently found around the Santa Barbara Islands (Cal.), and the tunny (*Orcynus thynnus*) or horse-mackerel visits our Atlantic coast. The tunny is larger even than the sword-fishes, reaching a length of ten feet and a weight of half a ton.

The true *Scombridæ* are rather elongated fishes and usually have a series of small finlets above and below the tail. The *Carangidæ* are an allied family, characterized by a more compressed, often very high and thin body, usually without finlets, and often covered with a row of plates. The most important North American food-fishes of this family are the horse-mackerel (*Trachurus saurus*), the various species of *Caranx*, better known as crevallés, the pompanos (*Trachynotus*), and the amber fishes (*Seriola*). *Caranx pisquetus* is the most abundant crevallé of the northern parts of the Atlantic. The common pompano (*T. carolinus*) is the most valued food-fish of the Gulf and Southern States. It ranges north to Cape Cod. The yellow-tail (*Seriola lalandi*) occurs on both coasts, and the rudder-fish (*S. zonata*) ranges from Cape Cod to Florida. In other small groups which are nearly allied to the mackerel come the well-known blue-fish or skipjack (*Pomatomus saltator*), the voracious and active destroyer of smaller food-fishes; and the harvest-fishes, one of which (*Stromateus triacanthus*) is very abundant from Maine to Cape Hatteras, while *S. simillimus* is not uncommon in summer on the Pacific coast, where it is known as pompano. Species of dolphin (*Coryphœna*) are occasional on the Southern Atlantic coasts. After the assemblage of mackerel-like fishes come the perch-like fishes, also divided into several sub-families. One of these (*Centrarchidæ*) consists exclusively of fresh-water fishes, and includes the crappie (*Pomoxys annularis*), calico bass (*P. sparoides*), Sacramento perch (*Archeoplites*), rock bass (*Ambloplites*), the various little fishes known as sun-fishes (*Lepomis*, etc.), and the black bass (*Micropterus*). The two species of *Pomoxys* are valued as food, and abound in the lakes and streams of the Mississippi Valley, etc., and the Sacramento perch is the only perch-like fish as yet discovered in the streams of California. There are two kinds of black bass, the large-mouthed (*M. salmoides*) and the small-mouthed (*M. dolomieu*). The first is usually rather the larger, but the latter is generally more valued as a game-fish. The true *Percidæ* are for the most part too small to be of much use as food, but the American or yellow perch (*Perca americana*), scarcely distinct from the European perch, and the pike-perch (*Stizostedium*) are exceptions. The common pike-perch of the Great Lakes, Upper Mississippi, and some Atlantic streams (*S. vitreum*) grows to a length of three feet, and is a highly valued food-fish of the inland regions. It has many names, as wall-eyed pike, dory, glass-eye, yellow pike, blue pike, and jack salmon. The lawyer, sand-pike, gray pike, or horn-fish (*S. canadense*) is a smaller fish of the same region.

Most of the *Serranidæ*, or sea-perch, are valued food-fishes of the warmer seas. Among them are the robalo (*Centropomus undecimalis*), found in the Gulf, and also in the coast of Lower California; the striped bass or rock-fish (*Roccus lineatus*), three other species of *Roccus* known as white bass, yellow bass, and white perch; the great Jew-fish, or black sea-bass of the Californian coast, five feet long, and 300 to 400 pounds in weight, and several species of *Serranus*. The black-fish, or black sea-bass (*S. atrarius*), is abundant from Cape Cod to Florida; the serrano or squirrel-fish (*S. fascicularis*) comes north to South Carolina; and three other species occur on the southern part of the Californian coast. The groupers (a corruption of the Portuguese name *garrupa*) are valued food-fishes of Florida and the Gulf. They belong to the genera *Trisotropis* and *Epinephalus*. The guasa (*Promicrops*) reaches a weight of 400 or 500 pounds, and ranges from the West Indies to Florida. The Sparidæ are well distinguished from the Serranidæ by the manner in which the lower jaw is received into a sheath when the mouth is closed, and by the larger and less comb-edged scales. The snappers (*Lutjanus*) are valued food-fishes of Florida, especially the red snapper (*L. campechianum*). The hog-fish (*Pomadasys fulvomaculatus*) occurs from New York southward, and is a food-fish of some importance. Two species of *Pomadasys* occur in California. The grunts (*Haemulon*) are another group of sparoid fishes which, like *Pomadasys*, are short and ovate in form. The genera *Sparus*, *Calamus*, and *Diplodus* have two or three series of large round-topped molar teeth in the jaws. The species are commonly known as porgies. Five species of *Calamus* occur in Florida, one of them the pez de pluma of the Spanish fishermen. The scup, scuppaug, or porgy (*Diplodus argyrops*), ranges from Cape Cod to Florida; and the sheepshead from Cape Cod to Texas. Both are among the most valued of our food-fishes. Other species of *Diplodus* are known as pin-fish and bream. The blue-fish of California (*Girella nigricans*), and *Pimelepterus bosci*, differ from the preceding Sparidæ in their herbivorous habits. The red surmullet (*Mullus barbatus*) and the bearded goat-fishes (*Upeneus*) are Floridian food-fishes. The Sciænidæ or croakers differ from the percoid and sparoid families in the absence of teeth on other bones of the mouth save the jaws, and in their generally less spinous aspect. Many are large, and nearly all are valued food-fishes. The drum, sheepshead, white perch or croaker of the great lakes, etc., the sea-drum (*Pogonias chromis*), the silver perch (*Sciæna punctata*), and channel-bass (*S. ocellata*) of the Atlantic coast; two species of Sciæna found in California, and known as Roncador; the spot or old wife (*Liostomus xanthurus*); the little roncador (*Genyonemus*) of California; the "whitings" of the Atlantic coast (three species of *Menticirrus*); the bagara of Southern California (*M. undulatus*); the large and highly valued white sea-bass of the Californian coast (*Atractoscion*); the weak-fish (*Cynoscion regale*) of the Atlantic coast; the corvina (*C. parvipinne*) of California; the spotted sea-trout (*C. maculatum*) of the Atlantic; and the king-fish or queen-fish (*Seriphus politus*) of California, belong to this family.

A very peculiar tribe of Pacific coast fishes is that known as Embiotocidæ. These are all viviparous, bearing a comparatively small number of young, which are at birth not unlike the parent: one kind lives in fresh waters. There are about 18 species, most of them sufficiently large and abundant to be used for food in considerable quantities, but none of them valued highly. In their cycloid or smooth-edged scales, well-developed lips, etc., these fishes resemble those of the larger family Labridæ, which yields the Cunner (*Ctenolabrus*), the tautog or black-fish (*Tautoga*), the hog-fish (*Lachnolaemus*), and the doncellas (*Platyglossus*) of the Atlantic coast; and the red-fish or flat-head of Southern California. *Ephippus faber*, the angel-fish or porgy, is a good food-fish of the warmer seas of both coasts. The blanquillo (*Caulolatilus chrysops*) of the Southern Atlantic States, and the white-fish (*C. princeps*) of Southern California, are good food-fishes. A large tribe of fishes, now considered as forming several families, is distinguished by having a bony stay across the cheeks from the eye. One of the subordinate groups (*Chiridæ*) contains about 15 species, all found in the North Pacific, and almost all valued for food. Two species of *Hexagrammus* are common in California, and are known as rock-trout or sea-trout. Three others are more common in Alaska. The common green cod or blue cod of the Pacific coast (*Ophiodon elongatus*) is no cod at all, but is none the less a large and very valuable food-fish, reaching a weight of 30 to 40 pounds. Another valuable fish of this family, the coal-fish or black cod (*Anoplopoma fimbria*), is, like the rock-cod, and some other fishes called cod on the Pacific coast, no cod at all, but appears to be an excellent food-fish, whether broiled or roasted like planked shad. In deep water it attains a length of 40 inches, and a weight of 15 pounds. The Haidah Indians are successful fishers for this fish, and use lines made of the grout kelp (*Nereocystis*), and hooks made of splints of the knots of hemlock steamed and bent into shape. The rock-cod of the Pacific coast are the mailed-cheeked and spiny-headed *Scorpœnidœ*. Twenty-seven species of the genus *Sebastodes* are distinguished by Jordan, all of them caught for food. They are exceedingly abundant along rocky coasts. The young are born alive in great numbers, but much less developed than the young of the Embiotocidæ. The rose-fish, red-fish, or snapper (*Sebastes marinus*), is an Atlantic species, and (*Scorpœna guttata*) is abundant in Southern California. The sculpin or bull-head family (*Cottidœ*) comprises both marine and fresh-water species, but few are of any value as food. *Scorpœnichthys marmoratus*, a very common fish from Puget Sound to San Diego, and reaching a weight of 10 pounds, is an exception. The elongated blennies, which have no ventral fins, or but small ones, and a long dorsal and anal, furnish the San Francisco market with the kelp-fish (*Heterostichus rostratus*), and with what, in the lack of true eels, are sworn to as eels, viz., the green *Apodichthys flavidus*, and the olive *Cebedechthys*. The wolf-fish (*Anarrhichas*) of the Atlantic, and the exceedingly elongated wolf-eel (*Anarrhichthys ocellatus*) of the Pacific, are also blennies. The last-named species is from 4 to 8 feet long, and has a heavy head furnished with large seizing and grinding teeth. It feeds largely on sea-urchins. By far the greater part of the about 90 species of *Gadidœ* are valued highly as food. (See Cod, Vol. II.) The burbot (*Lota*) is a native of the fresh waters of the northern parts of both hemispheres, while two genera are blind and inhabit the cave streams of Cuba. The other species are marine.

The flat fishes are peculiar in having the body flattened sideways, and both eyes upon the same side of the head. They swim with the eyed side uppermost. In very young individuals the head is symmetrical. Nearly 50 species occur on the coast of the United States. The genus *Citharichthys* includes five American species, mostly small, but *C. sordidus* of the Pacific coast is a food-fish. The halibut (*Hippoglossus*) is the largest of the flat fishes, sometimes reaching a weight of 400 lbs. The single species occurs in the northern seas of both hemispheres, ranging south to Cape Cod and San Francisco, and in Europe to France. Another very large species is known as the Greenland halibut. The Monterey halibut or bastard halibut (*Paralichthys californicus*) is an important food-fish, reaching a weight of 60 pounds. The common flounder of New England, ranging to Texas and the West Indies, is another species of *Paralichthys*, and five other species occur on the Atlantic coast, as well as *P. liolepis* on that of Southern California. The rough dab of the Atlantic coast, and four Pacific species, belong to the genus *Hippoglossoides*. Two species, *H. jordani* and *H. melanostictus*, are important food-fishes of the San Francisco markets, and are commonly called "sole." To the genus *Pleuronichthys* belong three California species, which, together with *Hypsopsetta guttulata*, a spotted species, pass for "turbot." The plaices (*Parophrys*) furnish 12 American species, 8 of them peculiar to the Pacific coast. The most important is *P. stellatus*, a large species with black-banded fins, common from San Luis Obispo to Kamschatka, and known as "flounder." Next in importance is *P. bilineatus*. Several other species are eaten, and some of those of the Pacific coast are of exceedingly delicate flavor; but, though a small species of sole (*Achirus*) occurs in the Gulf of Mexico, the fishes known as sole and turbot in Europe, and famed for their delicacy, are absent from the markets of the United States.

(W. N. L.)

FISH COMMISSION. The United States Fish Commission was established for the double purpose of fostering the fishing industries of the country by the propagation and distribution of food-fishes, and of investigation into the habits, habitat, food, etc., of food-fishes. Both these ends have been fully kept in view with such success as to demonstrate that pisciculture can only be carried on effectively by operations conducted upon a large scale. For the fish-cultural operations of the Commission see Fish-culture.

The total amount appropriated by Congress for the purposes of the Fish Commission since its inception in 1871–72 has been $1,679,415, besides $20,000 for the International Fishery Exhibition at Berlin in 1879–80, and $50,000 for that of London in 1883–84. Of the total amount $978,124 was expended upon the general work of propagation; $411,209 upon steam-vessels for the prosecution of research; $154,201 upon hatcheries, ponds, and distribution; and $54,500 upon the food-fishes inquiry. The remainder was divided among buildings at the station at Wood's Holl, railroad cars, illustrations, and rent.

The steamer recently built for the Fish Commission, the Albatross, 1300 tons, is a model of what a vessel should be for purposes of scientific research, while the Fish Hawk, 850 tons, is not good for heavy seas, but is well fitted for fish propagation.

There are now in operation, under the auspices of the Fish Commission, 17 hatching stations, of which the principal is at Wood's Holl, Mass. Here there are laboratories for research, hatching ponds for 2,000,000 young cod, and an excellent house for the staff.

Spencer F. Baird has throughout been the president of the Commission.

State fish commissions are now established throughout the country, and aid greatly in the work of fish-culture and fish protection. Besides investigations in the rivers, lakes, and coasts, the fish commission has pushed inquiry into the deep seas. The exploration of the Gulf Stream region off the outer banks of the southern coast of New England has been carried on most thoroughly by the Albatross. Successful dredgings have been made at various depths from 40 to 2600 fathoms. The bottom of the ocean in this region consists in some parts of a more or less impure globigerina ooze, but between 500 and 1200 fathoms it was in many cases found to be a tough compact clay, with a consistency like hard Castile soap. The ooze, when present, is always mixed with some sand and clay-mud. In other localities, from 1000 to 1600 fathoms, the bottom is covered with hard crust-like concretions of clay and iron oxide, with more or less manganese oxide in the crevices. The masses brought up varied in size from a few ounces to 20 lbs. or more. Rounded boulders and pebbles of granite, gneiss, and other crystalline rocks were found in some places. Between 2000 and 3000 fathoms the bottom met with was globigerina ooze. The "red clay" which at similar depths was found during the cruise of the Challenger was not observed.

The zoölogical results of these explorations have been most important. Of mollusca alone 336 species were added between 1880 and 1885. Forty-nine of these were dredged at depths exceeding 2000 fathoms, and 170 between 1000 and 2000 fathoms.

Huge spiny spider crabs over 3 feet across were taken; another very large crab (*Geryon*) occurred in abundance between 500 and 1000 fathoms, and a *Munidopsis* was taken in 2574 fathoms.

Two large sea-cucumbers or holothurians were obtained in abundance at great depths—one (*Benthodytes gigantea*) from 904 to 2033 fathoms; the other (*Euphronides cornuta*) from 861 to 1735 fathoms.

Sea-urchins of the curious genus *Phormosoma*, with flexible shells, were found up to 1230 fathoms. The irregular sea-urchin *Pourtalesia jeffreysii* was taken from 1253 to 1555 fathoms, and *Aerope rostrata* in 1608 fathoms. Two species of the beautiful star-fish *Brisinga*, both of them new to science, were obtained, and one of these ranged from 906 to 2021 fathoms. Three other star-fishes were found in more than 2000 fathoms, and two serpent-stars reached 2574 fathoms. Many before unknown fishes have also been taken—among them the fine food-fish known as the tile-fish (*Lopholatilus*), large numbers of which were for three summers found abundantly inside the Gulf Stream near 40° N. lat., and 70°–71° 20′ E. long. In 1882 dead tile-fish were observed in large quantities floating upon the surface, and investigation seemed to show that the destruction was due to a sudden change of temperature. (W. N. L.)

FISH-CULTURE, or PISCICULTURE, is an attempt upon the part of man to counteract the destructive effects of fisheries. Animal life is a constant struggle for existence, a warfare between reproduction and destruction. Even on the land a large portion of the forms of life live by preying upon other kinds, and in the sea this is still more the case, for there the vegetable world plays a less conspicuous part. The greater part of the fishes are carnivorous; and the safeguard of the weaker kinds consists chiefly in their greater powers of reproduction. Nearly all fishes are oviparous, laying an immense number of ova, yet, except under favorable circumstances, and within limited areas, the finny inhabitants of the seas do not increase in numbers. No sooner are the ova of even the most powerful fishes deposited than they are subject to the attacks of countless enemies. Not only do fishes, large and small, feed upon the eggs and just hatched young, but the invertebrate dwellers in the ocean do the same. The only advantage enjoyed by the most powerful predatory fish is that it has a chance of distancing its enemies by growth, and this chance is usually balanced by the fact that the ova of large fishes are more readily observed and attract a larger number of devourers.

See Vol. XIX. p. 135 Am. ed. (p. 126 Edin. ed.).

In any river, lake, or sea, a sort of balance between the forces of distribution and repair is observed until man interferes with his nets and lines, and causes the former to preponderate. It is comparatively difficult to exterminate a species, but persistent injudicious fishing has often destroyed the fishery. If the species for the sake of which the fishery is carried on is confined to a limited area, it may even be thoroughly exterminated, or at least brought down to numbers so small that it stands no chance of recovery. This result has occurred with several species of the large marine mammals which are hunted for their oil or other products; while fishes have been locally exterminated by contrivances which, instead of securing only well-grown examples of the kinds eaten by man, have destroyed wholesale the young of the food-fish, and the adults and young of the fishes upon which they live.

In the open seas fisheries do not often lead to the destruction of a fishery, for the reason that the species consumed by man are many, and he destroys the destroyer as well as the destroyed. Every ray or skate that is taken gives the flat fishes a better chance to live, while the catch of the dog-fish, bonito, blue-fish, etc., is a distinct gain to the herring and other small fishes.

The destruction of fish in rivers and lakes may be effected without fishing. Though the larger fishes live to a great extent upon the smaller, and the smaller feed partly upon the ova of the larger, living beings of lower grade and smaller size than fishes form the food of the smaller species, and thus the existence of food-fishes depends upon that of the minute animals which form their food.

Life, whether vegetable or animal, can be preserved only in water that is comparatively pure. The death of both plants and animals tends to render the water impure, but the process of oxidation, constantly going on, will under normal conditions keep the waters fitted to supply the needs of fishes. But stagnant waters, and those into which a larger amount of decaying matter is poured than can be quickly oxidized, become incapable of supporting a supply of fish (1) on account of the death of the small organisms which form the basis of the food supply, and (2) by poisoning the fish themselves.

Harbors, estuaries, and more or less enclosed bays and gulfs, are to some extent under conditions similar to those of rivers. Although some of the great fisheries, such as those of the cod and mackerel, are carried on in open waters, a large part of the marine fishes taken for food consists of species which habitually live near shore. The effect of wasteful or immoderate fishing upon a shore-living species is to rapidly diminish its numbers, and, since it cannot at once be recruited by individuals from without, and has not the advantages afforded by migration, further fishing for it becomes unprofitable.

Fish-culture, therefore, in its broadest sense does not consist only of the art of fish-breeding, but includes (1) the preservation of rivers, lakes, harbors, estuaries, and shore waters in a normally pure condition; (2) the prohibition of methods and seasons of fishing which have been proved too destructive, or clearly would prove to be so; and (3) the destruction of such creatures as prey upon food-fishes, and the encouragement and growth of plants and animals which serve them for food.

The first of these aids to fish-culture has as yet scarcely been attempted. Every town befouls the neighboring streams with sewage and with the refuse products of manufactories, and the foreshore of every port and seaside resort is the cesspool of the inhabitants. The deposition of cinders from steamers has also an injurious effect in confined waters.

Various laws have, both in this country and in others, been enacted for the preservation of food-fishes during the spawning season, for the prevention of over-fishing, and for the prohibition of too effective engines of destruction. Such laws are, however, systematically evaded, and, as most fisheries can be carried on at spots remote from supervision, regulations of the most judicious kind fail to produce the effect expected from them. Thus the tendency, especially in this country, is to place most reliance upon actual fish-breeding, and upon the culture of the young fry in normally pure waters. In the case of many ocean fishes, and of all those which ascend rivers to spawn, the spawning season is the only one in which they can be caught.

The productiveness of any confined piece of water is limited by the amount of fish-food contained within it. In order to successfully rear a larger number of young fishes than could be under normal conditions supported by a pond or tank, artificial feeding has sometimes been resorted to, especially in Germany, with successful results. Small crustacea, as water-fleas (*Daphnia*) and *Cyclops*, are very acceptable food for young fish, and so also are the larvæ of small insects, such as gnats and mosquitoes, for which man can thus find a use. A supply of these animals can readily be obtained by placing decaying vegetable matter in a tub of water. Growing carp will thrive on cooked cereals and vegetables, kitchen scraps, etc.

Another method to promote the growth of fish is to encourage that of such water-plants as furnish shelter to protozoans, crustacea, etc. It has been found that the azolla, a cryptogam which covers the water with a variegated carpet formed by its imbricated leaves, and the water-chestnut (*Trapa natans*), a flowering plant with extensive fibrous roots, are excellent plants for carp-ponds on account of the harbor they afford to animalcules. The water-purslane (*Ludwigia palustris*), yellow and white water-lilies, Tuscarora rice (*Zizania*), and American lotus (*Nelumbium luteum*) are good plants for carp-ponds, as are most water-plants except pond weed and the water-shield (*Brasena*), which take possession of too large a part of the pond.

The enemies of food-fishes are by no means confined to creatures of their own class. In lakes and rivers large numbers of the young are destroyed by water-beetles, by the predaceous larvæ of dragon-flies, by frogs, which seem to have great fondness for small carp, and by turtles and snakes. Muskrats must be reckoned among their enemies; and even plant-life, which in most cases furnishes food and shelter to fishes, takes its turn at fish-destruction. It has been proved that the *Utricularia* or bladder wort, a common water-plant with finely divided leaves and conspicuous yellow flowers, has the power to seize and hold within its bladders the tiny fry, and to absorb the products of their decomposition. In the ocean there are numerous invertebrates sufficiently powerful to destroy small fishes, and some which devour large ones. Polyps of various kinds, free-swimming and fixed, furnished as they are with deadly lasso-cells, readily kill small fishes; the crustacea are active enemies; and squid, large and small, are voracious devourers of all that they can master. It has been proved that squid destroy large numbers of mackerel. To these enemies must be added the large carnivorous mammals of the sea, the sea-lions, seals, dolphins, and whales. A sea-lion in captivity will devour forty pounds of fish per diem, yet for many years the colony near the entrance of San Francisco harbor was protected by law. Evidently the fishes used for food can be rendered more abundant by the systematic destruction of their enemies. In small rivers and lakes, where the habits of the denizens are tolerably well known, and the area not too large to be controlled, something may be done in this direction; and even in harbors and bays it is manifestly in the power of mankind to keep down the numbers of seals; while the establishment of a shark-fishery, whether for flesh or oil, must relieve the food-fish of some of their most active foes.

Among methods of fish-culture, in the sense of preservation, one of the most important is that of fish-ways, *i. e.*, contrivances placed within the river-bed to enable migratory fishes to surmount a cascade or dam which otherwise would bar their passage. A large number of contrivances have been invented for this purpose, and many that have been erected at considerable expense have proved inadequate. One of the best known fish-ways used in this country is known as the McDonald.

The methods of fish-breeding now practised are comparatively new. The Chinese cultivate the eggs and fry, but do not seem to be acquainted with artificial fertilization—with the mode of stripping the ova from the female fish, and mingling them with the milt taken from the male—which has recently led to such important results, and has been extended even to oysters.

The art of artificial fertilization was discovered by Stephen Ludwig Jacobi, of Westphalia, in 1748, and was carried on by Shaw in England and Remy in France for several years before the now historic station of Huningue, in Alsace, was established. As knowledge of the sexes and habits of various food-fishes progressed, the practice of the art was extended, and the large numbers of ova and young fry rendered available by this means have been distributed far and wide, so that many food-fishes have not only been introduced to distant waters in their native country, but into far distant countries.

The United States.—Although this country was not the first to practise pisciculture, in no other country at the present time is the art carried on so successfully or so extensively. The fishes which have been most extensively hatched and introduced into new waters in this and other countries are the California salmon (*Oncorhynchus chouicha*), known also as the quinnat; the true salmon (*Salmo salar*), as well as its variety, the land-locked salmon (*S. sebago*); the eastern brook trout (*S. fontinalis*); the California brook trout (*S. irideus*); the white-fish (*Coregonus albus*); the cat-fish (*Amiurus albus* and *nebulosus*); the shad (*Clupea sapidissima*), and the carp (*Cyprinus carpio*). An establishment for the propagation of striped bass (*Roccus lineatus*) is in operation at Weldon, S. C.

No food-fish has received more attention than the shad. Some idea of the extent of the work done with this fish may be obtained from the fact that during the three years 1883–85 the number of shad eggs hatched at Central Station, Washington, was 53,089,000. Twenty-six millions of shad eggs have been planted in North Carolina since 1877. The plant of shad made in Georgia in 1880 and 1881 (2,800,000 shad fry) has been successful. The Chattahoochee, Ocmulgee, and Etowah Rivers have thus been stocked, and shad were taken out abundantly in 1884. The fish is rapidly becoming common in California since its introduction, but here it has preferred to frequent sheltered bays, such as that of Monterey, rather than to ascend the Sacramento, though it was first introduced in that river.

The great success which attends artificial propagation may be judged from the results of the shad-hatching operations at Battery Station, Md., from April 16 to June 11, 1885. During this period 3512 shad were taken. the total number of eggs from all sources was 13,357,000, and 10,725,000 of these were hatched.

Since the spring of 1875 nearly 92,000,000 of white-fish fry have been planted in Lake Erie by the United States and Ohio and Michigan Fish Commissioners. Of these 42,000,000 were planted in the spring of 1882. The results have been evident. Not only has the decrease which was the result of persistent and skilful fishing been arrested, but a tangible increase has taken place, more marked in 1884 than in previous years.

Another fish to which great attention has been paid is the German carp (*Cyprinus*), which was first imported by Mr. Poppe, of Sonoma, Cal., in 1872. In 1882 those bred at Washington were distributed in lots of twenty to 10,000 applicants in different parts of the country. The fish has now been placed in 30,000 separate waters.

Attempts to introduce the California salmon on the Atlantic coast proved a failure, but not so the restocking of depleted California waters. The McCloud fish-hatching station, near Mt. Shasta, Cal., was established in 1872. In 1873 2,000,000 of eggs were taken by using seines, but in 1874 6,000,000 were obtained by putting a fence across the river to stop the upward course of the fish. To accommodate the eggs within a moderate area, several layers were stacked over each other in trays laid in troughs through which water had to force its way. In 1878 14,000,000 of salmon eggs were successfully taken, two car-loads of which were shipped to the Atlantic coast and several millions to foreign countries. In 1880 a trout-breeding station was established, and 338,000 trout eggs were taken. The floods of 1881 swept away the station, which was at once rebuilt, and 7,500,000 eggs taken and mostly hatched for the Sacramento River. In 1882 and 1883 the catch was small, and in 1884 the station was closed. The effect of the introduction of the artificially reared salmon into the Sacramento has been so great that, whereas in 1872 the canneries were closed, twelve years after there were 15 canneries running.

Very much has yet to be learned respecting fish-culture. It is practically a science of the past sixteen years. At most a few hundred people are interested in it, while every fisherman and the community generally are practically hostile to it. Comparatively little is yet known with reference to the embryonic life of fishes, suitable temperatures of water, the proper kind and necessary amount of food, and many other things. For these reasons it cannot be claimed that every introduction made has been a success. The conditions of life were not always favorable to the strangers, who either met with too many enemies, failed to find food, or were in some other way prevented from prospering.

Appliances for hatching fish-ova have gradually been perfected, and very few are now lost. To prevent destruction by fungus, constant movement is necessary. To effect this McDonald's fish-hatching jar, by which a current is sent among the eggs so as to impart to them a regular, rolling, boiling motion, and provided with an exit tube by which dead eggs can be removed at pleasure, has proved a great success. One of the greatest causes of the death of young fish is the appearance of fungus. This is always attendant when there is not sufficient change of water, and is also pretty certain to grow upon wounds.

The cost of production of shad at Central Station, Washington, has been at the rate of $330 for each million of shad fry furnished for distribution; or more than 30 for one cent.

Great Britain.—Although considerable interest has for many years been taken in fish-culture, very little has yet been done compared with the progress made in this country. The British fisherman still takes all that comes to his net, and, though the ocean fisheries still seem to keep up their average, many rivers and inland waters have been depleted. Salmon especially, once the most common of fish in Scotland, have become rare, the Scotch rivers not yielding half the quantity they once afforded. Yet no Scotch river, save the Tay, on which the establishment of Stormontville is situated, has been stocked with fry.

One of the most successful private fish-cultural establishments in Great Britain is that of Howietown, owned by Sir J. Gibson Maitland, of Stirling, Scotland. Upwards of 10,000,000 trout ova are annually incubated here. In 1884 90,000 yearling trout were delivered to various parts of Great Britain and Ireland, and two consignments of trout ova and one of salmon ova were successfully forwarded to New Zealand. Yearling trout are strong enough to find their own food, stand a journey well, and accommodate themselves readily to new water. A twenty hours' journey in ice water does not hurt them, but they must be introduced into water of the same temperature or the gills become inflamed. Eleven private fish-hatcheries are now in operation in Scotland, but the government does nothing.

Eggs of several American fishes have been sent to England. The brook trout does not seem to have become acclimatized, spite of several attempts. Considerable opposition is manifested to the introduction of the cat-fish, which is not acceptable to the large British angling fraternity.

Sir Lyon Playfair has put on record his belief that much of the lack of progress in fish-culture in England is to be attributed to the fact that commission after commission has examined fishermen and obtained from them a vast body of contradictory evidence, while the American commissioners, instead of seeking information from men who, though they gain their living by taking fish, know less about fishes than the community, have investigated nature directly and worked in a scientific manner.

Canada.—In 1883 Canada had eleven government hatcheries in operation, eight of which were occupied exclusively with salmon eggs. There are also two private fisheries engaged in salmon-hatching. The oldest of these hatcheries had then been in operation fifteen years, the latest two years. The entire cost to date was $259,400. Two hatcheries are employed in hatching salmon, white-fish, and trout, and one hatches pike, perch, and white-fish. The entire number of fish bred and distributed up to 1883 was about 105,000,000, of which about 20,500,000 were salmon and 60,500,000 white-fish.

Europe.—Preservative laws have in France proved inoperative, for when the "prohibited" nets are unproductive, lime and *Cocculus indicus* are used to poison the fish, or dynamite is employed. Nothing is really done, and both sedentary and migratory species are passing away from the rivers. On the other hand our eastern brook trout and the California salmon are in process of acclimatization in France, and are increasing in many water-courses.

Intelligent interest in fish-culture is taken in the Netherlands, Switzerland, and Norway. In 1884 considerable numbers of various species of fishes, including American salmon, were placed in Lake Zurich by the fish-cultural establishment of the canton.

Among European countries Germany appears to take the lead in fish-culture. Carp have been extensively reared for centuries, and reports from various rivers show that success has attended the culture of salmon, sea trout, brook trout, lake trout, char, grayling, white-fish, carp, and eels. An attempt has been made to introduce the eel into the Danube, where it is not native. The eastern brook trout is already acclimatized in Germany, so much so that impregnated eggs have been sent from Pomerania and Mecklenburg to other parts. It flourishes also in Upper Hungary and in Bavaria. The California trout is doing well, and the same is true of the land-locked salmon and white-fish. Several other American species have been introduced into Germany and other European countries, but the success of the attempt is not assured.

Australia.—Salmonoids were not originally found in Australia. In 1852 an attempt was made to introduce salmon and salmon trout, but failed. The same result attended efforts made in 1860 and 1862, but in 1864 these fishes were successfully introduced. Other importations were made, and at the present time the salmon trout is well acclimated in the rivers of New Zealand, Tasmania, and Victoria. Both salmon and salmon trout are frequently taken, the first up to twenty-eight pounds. Several varieties of carp, perch, and other fresh-water fish have also been introduced, and the common tench (*Tinca vulgaris*) and perch (*Perca fluviatilis*) have greatly increased. The California salmon has also been introduced.

China.—Pisciculture in China is of early date. A treatise on rearing fish is ascribed to Fanli, who lived in Che-kiang in the fifth century B. C. A quotation from it, in a work written long before the commencement of our era, shows that fabulous ideas of the rate of increase were entertained. Carp and many other Cyprinidæ, bream, tench, gold-fish, etc., are cultivated. It is stated that ova hung up to dry near a chimney will hatch if cast into a pond in the spring, and this even after three years. Che-kiang is the original home of the golden carp, all the varieties of which come from a black species. Much of the art of changing their color consists in affording due amounts of shade and sunshine. The Chinese entrap male fish with imprisoned males, and in a similar way decoy the females. They do not in all cases cultivate the ova, but take very small fishes, and seem to impartially include all kinds. In other cases they catch the spawn in closely woven bags with wide mouths, the insides coated with paste of white of eggs and flour, to which the spawn adheres. In Southern China the fish-ponds are located on tidal rivers, streams, and creeks, and the fish are fed with human excrement, washed twice to extract the liquid fertilizers, and then mixed with finely cut young grass and fed to the fish. For this reason foreigners seldom have fresh-water fish on their tables. (W. N. L.)

FISH, Hamilton, an American statesman, was born in New York city, Aug. 3, 1808, being the son of Col. Nicholas Fish. He graduated at Columbia College in 1827, and was admitted to the bar in 1830. He was frequently a candidate of the Whig party, and in 1837 was elected to the State Assembly. He served one term in Congress, 1843–45, and in 1847 he was elected lieutenant-governor of the State. He was next elected governor, serving from 1849 to 1851, when he was chosen United States senator. At the close of his term he went to Europe, where he resided until 1860. During the civil war he gave liberally of his means and influence in aid of the government. In 1862, by appointment of Secretary Seward, he took part in negotiations with the Confederate government, which led to the subsequent rules for exchange of prisoners. Gen. U. S. Grant, on becoming president in 1869, called Mr. Fish to be Secretary of State. The duties of this office he discharged with vigor and ability, until the close of President Grant's second term. The most memorable events of his administration were the negotiation of the Treaty of Washington, signed May 8, 1871, and the settlement of the Alabama claims by the Geneva tribunal of arbitration, Sept. 14, 1872.

FISH, Nicholas (1758–1833), an American military officer, was born in New York city, Aug. 28, 1758. He entered Princeton College, but soon left to study law under J. Morin Scott. His preceptor was made a general when the revolutionary war commenced, and Fish became his aide-de-camp. He was in both battles of Saratoga, commanded a corps of light infantry at Monmouth, served in Gen. Sullivan's expedition against the Indians in 1779, and in the operations at Yorktown in 1781, being then a lieutenant-colonel. In 1786 he was appointed adjutant-general of the State of New York, and held that office several years. In 1794 President Washington appointed him supervisor of the revenue, and in 1797 he became president of the New York Society of the Cincinnati. He died at New York, June 20, 1833.

FISHER, George Jackson, an American physician, was born in Westchester co., N. Y., Nov. 27, 1825. He graduated from the medical department of New York University, March 1, 1849. He was physician of New York State prison at Sing Sing in 1853–54, president of the Westchester County Medical Society 1857–58, and president of the New York State Medical Society in 1874. He has published *Biographical Sketches of Physicians of Westchester County* (1861); *Animal Substances employed as medicines by the Ancients* (1862); *Diploteratology* (1865), and other professional works.

FISHER, George Park, an American clergyman, was born at Wrentham, Mass., Aug. 10, 1827. He graduated at Brown University in 1847, studied theology at New Haven and at Andover. After further study in Germany, he was made professor of divinity in Yale College in 1854, and in 1861 became professor of ecclesiastical history. He has been a frequent contributor to the leading literary and theological reviews, and since 1866 one of the editors of the *New Englander*. He has published *Essays on the Supernatural Origin of Christianity* (1865); *Life of Benjamin Silliman* (1866); *History of the Reformation* (1873); *Beginnings of Christianity* (1877); *Discussions in History and Theology* (1880), relating chiefly to the Roman Catholic Church and to New England theology; *Grounds of Theistic and Christian Belief* (1883). Prof. Fisher combines in admirable proportion the best qualities of the historical essayist and the Christian philosopher.

FISHERIES. The systematic quest and capture of any animal which resides in water is popularly known as a fishery, the word being a survival of the old idea that all aquatic animals are fishes. Certain of the most important marine and fresh-water animals are made special objects of search; ships, boats, nets, and engines of destruction being manufactured specially for their capture. Thus there is a whale-fishery, a seal-fishery, a cod-fishery, a herring-fishery, a salmon-fishery. The majority of aquatic animals are not of sufficient importance to be thus made sole objects of search, but form part of the miscellaneous fishery carried on in a locality.

This article will be confined to the fisheries of the United States and British America, yet some idea of the great importance of the total harvest of the sea, a harvest gathered in wasteful fashion, from a crop that is neither sown nor tended, may be derived from statistics which show that nearly 150,000 vessels are engaged in fishing in Europe and America, and that between 600,000 and 700,000 men are employed. The total animal product is said to be not far short of 1,500,000 tons.

North Atlantic Fisheries.—Of these the cod-fishery in its generic sense is the most important. Though it has already been treated under Cod, in Vol. II., the following statements give additional information about its methods as practised by American fishermen.

The banks most used by fishermen are Iceland Banks, Greenland Banks, Grand and Western Banks, Flemish Cap, Banquereau, La Have, Brown's Bank, St. George's Bank, and numerous smaller banks, all of which are outside of all national jurisdiction. On these banks are found the finest specimen of the cod, varying in size and quality. The St. George's Banks, lying 125 miles south-east from Cape Ann, affords the finest fish. The bank-fishery is pursued in vessels from 50 to 200 tons burthen, and the manner of taking the fish is principally the French trawl system, viz.: by the use of a long line extended along the bottom of the ocean, secured at either end by small anchors, which are buoyed to the surface by means of buoy-lines to which are attached empty wooden kegs with a short staff with a flag attached to mark the location. Hooks baited with short gangings are attached five feet apart on the main line of the trawl. These trawls are from 500 to 1500 feet in length. They are set and remain from 12 to 24 hours, when they are underrun, the fish taken from the hooks, a new bait put on the hooks, and the trawl left as before. In this way 300 hooks are used on one trawl. This kind of fishing is done in dories, small boats which are carried on the vessel, and are each manned by two men. This business is peculiarly hazardous, as the dories go quite a distance from the vessel and often go astray in the fog which prevails or are overloaded with fish and in case of sudden winds are swamped. The loss of life is very great.

On George's and other banks from Gloucester alone 419 vessels and 2249 men have been lost from 1830 to 1881. The old hand-line system and fishing direct from the vessel is almost entirely superseded by the trawl system.

The inshore cod-fishery is largely pursued in small boats that go out and return daily. Most of the British North American cod-fisheries are of this character. The fish taken are smaller than the bank fish and are well adapted to the West Indies market. During the existence of the Washington treaty the Dominion of Canada and Newfoundland have largely increased their bank fleet of vessels. The American fishermen take no fish except mackerel in so-called British waters. The entire bank fisheries are outside of all national jurisdiction.

Another method of taking cod lately come into use is the gill-net, with meshes large enough to take the larger fish but allowing the small fish to pass through. In the winter and early spring months the fish are readily taken by this method, but later they shun contact with the net, and the fishermen explain this by claiming that the sight of the fish is impaired at this time. It is a theory which seems to be sustained by observation that fish at the time of spawning are more reckless and less careful than at other times, and the fishermen hold that fish imbed themselves in the mud, and when they come out to frequent the banks or shores where they spawn a film has grown over the eye to protect it from contact with the mud, and it renders them partially blind for a short season, and, therefore, they do not avoid the net. These nets are set in the same manner as herring gill-nets and hang perpendicularly, being sustained by glass balls at the top with the lower line of the net resting on the bottom. This manner of setting is necessary, as the cod-fish swim near the bottom and their food, consisting of cockles, shell-fish, and shrimps, is found there. This method of sinking gill-nets to the bottom has proved very successful in other fisheries, and finer and better qualities of fish are taken by this process. The old method was to sustain the net at the surface with cork buoys and let it hang from them downward. This is well in shoal water, but in deep-water fishing the new method is far superior.

The other varieties of the fisheries, consisting of the halibut, haddock, pollock, hake, or ling, are taken similar to the cod-fish, although the halibut, which once was so plenty on all the banks and also frequenting the shore, is now becoming very scarce, and is mostly found in the deepest water where there is a divergence of the banks in the intervals between them. One hundred and fifty fathoms is the depth at which most of them are now taken. Pollock and hake are found mostly within a few miles of the shore and are taken at certain seasons of the year; but the cod-fish is perennial and is the grand basis of the fishing business, being available at all seasons.

The history of the treaties relating to the North Atlantic fisheries and their effect upon this industry will be given later in this article.

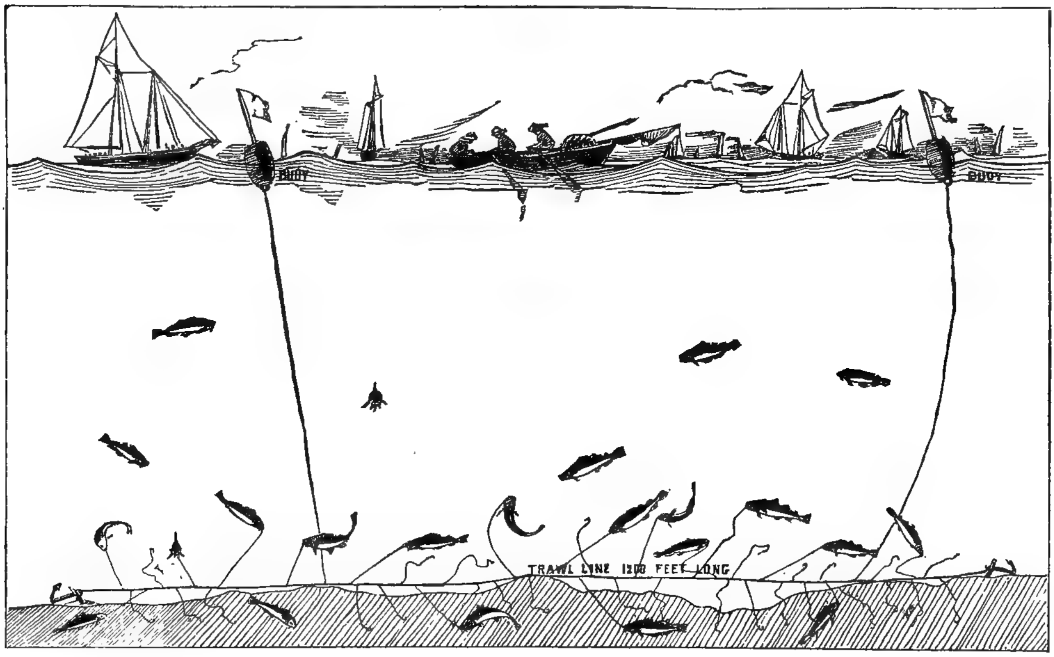


Fig. 1.—Cod Trawl-fishing.

The great migrations of mackerel, herring, and menhaden, or porgies, represent a large interest in the prosecution of the Atlantic fisheries. The mackerel make their appearance near Cape Hatteras as early as the month of April, and pursue their way northward, and are found off the New England coast from June until November. It is a question as yet undecided whether the migration of mackerel is entirely from this direction, or whether they come in toward the shore from the borders of the Gulf Stream simultaneously north and south. It is claimed that an early school of mackerel make their appearance in the Gulf of St. Lawrence on Banks Bradelle and Orphan in the month of May, and it would appear that the Gulf of St. Lawrence was the northern limit of their migration, although at times mackerel of large size and coarse texture have been taken at Newfoundland. The mackerel-fishery as such did not assume any great distinction as a peculiar fishery by Americans until 1820, and the methods of taking have changed from the drailing process—that is, extending poles from the sides of the vessel with lines attached while the vessel under sail run through the schools—to the hand-line system and the distribution of bait ground fine to attract the fish to the surface. It was under this process that the mackerel-fisheries of the Gulf of St. Lawrence were so largely developed, and an American fleet of 600 vessels usually resorted to the Gulf of St. Lawrence to take mackerel. Immense quantities of menhaden were used for bait in this fishery, each vessel taking, on an average, 50 barrels of slivers (which are the flesh of the menhaden cut from the vertebræ and salted in barrels for this purpose). This was ground fine by hand-mills and scattered on the surface to attract the fish. This immense feeding process with this peculiar oily bait was very attractive to the mackerel, kept them together in a great body, prevented their scattering for food, and thus made them available to the small boats as well as to the vessels, as the bait thrown kept the mackerel near the shore. The introduction of the purse seine and its universal adoption by the vessels changed the entire character of this fishery. The operation of these seines requires great depth of water in open sea, and, if used in shoal water, requires a clean, sandy bottom, as rocks destroy the seine and the fish escape. The mackerel that heretofore were coaxed and enticed by bait to become victims were now ruthlessly assailed at the entrance of their migration north, enclosed before they were aware in the immense wall of net, the lower part of these walls being drawn together under them, forming a complete net purse of gigantic size. In this manner a thousand barrels are secured at one haul. The vessel is then brought alongside of the seine, and the fish bailed out and dressed at the convenience of the fishermen. This warfare, commencing off Cape Hatteras in March, is kept up unceasingly throughout the season, not only in the daytime but in the night. A fisherman at the masthead is able in the darkness to trace the movement of the fish in the water by the agitation of the phosphorescent particles in the water, and directs the operations of the boats and setting of the seine. Many fish are thus taken in the night that would be shy of the surface in the daytime. This incessant pursuit of the mackerel disturbs their migratory course and is gradually driving them farther from the shores, and the fishery is becoming more and more an ocean fishery. In addition to the seine methods for the capture of mackerel the shore weirs are being largely used, and when the mackerel are pursued by their natural enemies, the blue-fish, bonitos, or sharks, etc., they frequently endeavor to escape by swimming close to the shore. The weirs, constructed in shoal water of stakes and bushes and in deep water of walls of netting, intercept them by what is called a leader, which is an extension of the weir by a single wall of net reaching out 500 feet or more from the body of the weir. The fish meet this wall of netting, and instead of turning back they follow along the side, and are thus led into the weir, which is so constructed that the way to go out is never apparent to the fish. Many of these weirs are models of ingenuity and are patented. It has been questioned whether this wholesale destruction of mackerel would not in time be total destruction of the fishery, but scientific observation and statistics show that while locations may be temporarily affected, yet the impression made upon the great life of the ocean is not apparent. The shore-fisheries for mackerel on the American coast and in the Gulf of St. Lawrence have sensibly diminished under the operation of the seine and weir fisheries, and the fish are exhibiting a shyness which did not exist under the hook-and-line system.

The menhaden- or porgy-fishery is fast becoming a lost art in northern waters. The first use made of this fish was for bait for cod-fish, and during the summer months these fish were so abundant in the creeks, harbors, and rivers of New England, that they were used as a fertilizer by the farmers. After the mackerel-fishery became a staple business they were used for bait, and when ground fine the oily nature of the bait would float it near the surface and attract the mackerel so they could be taken with hook and line. The menhaden never went north farther than the shores of Maine and were not available to the provincial fishermen. They usually made their appearance at or near the mouth of the Chesapeake Bay and came north about the same time as the mackerel. They courted the shore in their migratory progress, and were very numerous in their season in Long Island Sound, along the New England coast, and especially in the waters of Maine. In their early advent they are poor in quality, like the mackerel, but if unmolested and allowed to come into the northern waters they become very fat and yield great quantities of oil. As the fishery is now conducted by means of seines and weirs, they are almost annihilated except in Long Island Sound, and a school of them is rarely seen north of Cape Cod in the harbors and creeks as formerly. But few are used for bait, none being necessary in the mackerel vessel fishery as all use seines, and the system of weirs furnishing small fish and herring which with the yield of clam-bait equips the cod-fishermen. The menhaden-fishery is now almost exclusively confined to the oil-producing factories, which use steamers and seines largely in their capture. The increase of this branch of the fishing business has been sudden and immense, and it bids fair to decrease from the extinction of the fish in the localities that abounded with them. In 1878 the menhaden oil and guano industry employed capital to the amount of $2,350,000, 3337 men, 64 steamers, 279 sailing vessels, and consumed 777,000,000 fish. There were 56 factories, which produced 1,392,644 gallons of oil, valued at $450,000, and 55,154 tons of crude guano, valued at $600,000: this was a poor year. In 1874 the number of gallons produced was 3,373,000; in 1875, 2,681,000; in 1876, 2,992,000; in 1877, 2,427,000. In 1874 the manufactured products were $1,809,000; in 1875, $1,582,000; in 1876, $1,671,000; in 1877, $1,608,000; in 1878, $1,050,000; in 1880 there were employed in this industry 3635 persons; capital invested $2,362,841; the value of products, $2,116,787; the fishermen numbered 2543; the factory hands, 1092; vessels employed, 456, of 12,905.71 tons; vessels' value, $1,009,650; value of outfits, exclusive of nets and boats, $143,819; number of boats, 648; value, $65,435; number of purse seines, 366; value, $138,400; value of factories with fixtures, $1,009,537; pounds of menhaden taken, 570,424,377; gallons of oil made, 2,066,396; value of oil, $733,424; tons of guano, 68,904; value of guano, $1,301,217; value of menhaden compost, $61,699.

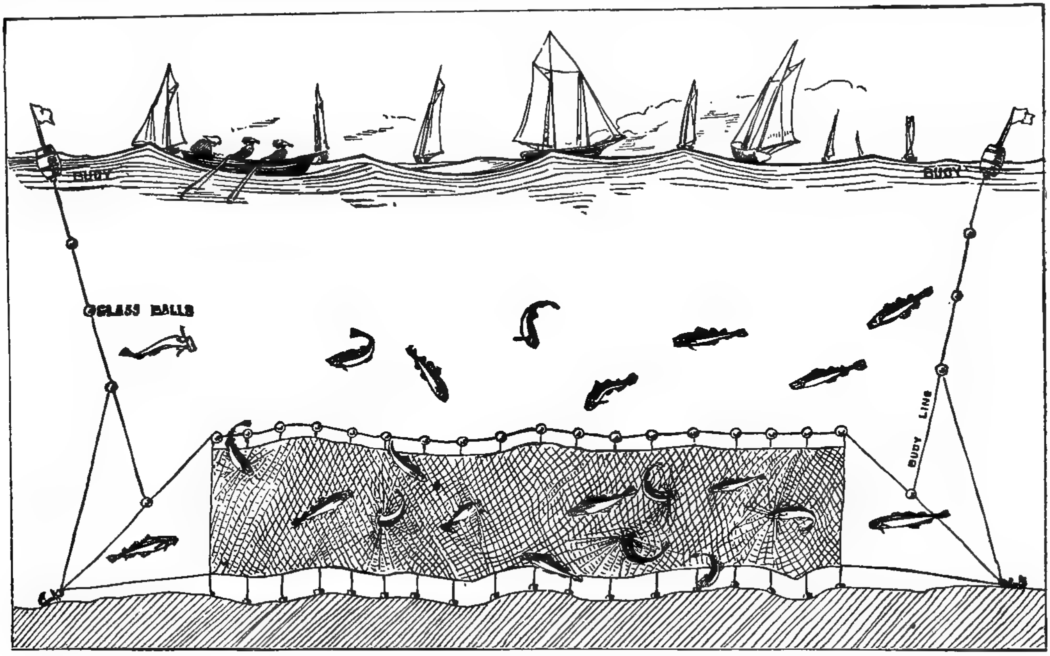


FIG. 2.—Cod Gill-net fishing.

The Atlantic herring-fishery is a shore-fishery. The only general use made of vessels is as a means of transportation. The herring strike in upon the coast of Massachusetts and Maine in the late fall and early winter to spawn; they are taken in gill-nets and weirs, and are salted, pickled, or sold fresh for food or bait to the cod-fishermen. Later in the season they are usually very abundant on the coast of New Brunswick, Grand Menan Island, Bay of Fundy, and in January in the bays and coves of Newfoundland. The usual process of taking by gill-nets has the effect to strangle the fish, causing a redness of the eyes which is detrimental to their appearance when fresh or frozen; and since the introduction of seines and traps or weirs, they are frozen or preserved in better condition after being taken from the seines. From 50 to 100 vessels pursue this business for about three months in the year. The fish are all taken by the local fishermen and sold to the vessels, which receive them fresh, and by means of freezing before being loaded in the vessel they are kept fresh and sweet for a number of weeks. In this condition they are brought to the United States and sold for food or bait for the fishermen's use. As this business is a mercantile transaction on the part of the Americans, the entire benefit of the production goes to the local British fishermen. This fishery occurring in the winter on these coasts where the only resource is in taking fish, affords a remuneration to the coast-fishermen which saves them from the extreme poverty and distress which characterizes the life of many of the fishermen on these coasts and the coasts of Ireland. Previous to this trade the government of the Provinces was often obliged to afford aid and sustenance to the poor fishermen of these localities, but, under the system of trade initiated by the Americans paying cash for bait-fish and herring, the people enjoy a prosperity unknown to them before. Under the Washington treaty the Americans had an undoubted right to use their own seines and nets in these waters. On Jan. 6, 1878, the Americans attempted to exercise this right at Fortune Bay, Newfoundland, but were resisted by the local fishermen, their seines destroyed, and the voyages broken up. Great Britain afterwards paid $75,000 as indemnity. The poor fishermen of the coast have nothing but these fisheries to sustain themselves and families, and no treaty will be acknowledged by them that takes these fisheries from them.

The preparation of small herring as sardines is an industry that has grown into large proportions. Experiments were made in this business as early as 1866, but its existence as a business dates from 1875. In 1880 it furnished employment to over 1500 fishermen and factory-hands, in addition to 376 fishermen belonging to New Brunswick; the whole capital employed is $560,000, and the value of the products, $825,000. The entire herring- and sardine-fisheries of the United States show a valuation of $1,130,000.

In the preparation of fish for market, great changes have taken place in mode and methods. Ice, formerly unknown to the operative fisherman as a preservative, now constitutes one of the greatest factors in his business. The canning process utilizes the small fish, and the entire absorption for fertilizers of every portion that constituted the waste shows a steady progress in the scientific development of this hitherto neglected industry. The researches and results of scientific investigation aided by the government and sustained by the indefatigable exertions of the Smithsonian corps of scientists, will in time develop not only new fisheries and locations, but establish reliable systems by which the fisherman may guide his business according to recognized authority rather than by luck. In no business are such high qualities of risk and daring displayed, and the sad record of continual loss of life and property shows the power of the element with which they contend. In this business, pre-eminently, labor and capital share mutual profit and loss, both are banded together for success, and need neither strike nor arbitration to adjust their relations. (F. J. B).

The Southern Fisheries.—Pensacola and Key West are two important fishing-points in the Southern States, and the character of the fisheries there will give a good idea of the Southern fisheries in general. Besides the distinct fishery for the red snapper, a large amount of shore-fishing is done. the principal fishes being blue-fish, pompano, and Spanish mackerel. In 1885 the catch of Spanish mackerel at this point in the month of April was 121,931 pounds.

The history of almost all the Gulf fisheries shows that where pursuit has in any locality been vigorous the supply has rapidly diminished. This is true only of the bottom fishes, as sheepshead, channel bass, mullet, snappers, etc., and does not refer to migratory fishes, such as the pompanos and mackerel.

The mullet-fisheries carried on at Cedar Keys, Charlotte Harbor, and other points on the Florida coast are of considerable importance. At Cedar Keys the season begins about the end of November and continues until the first ten days of February, December and January being the best months. The fish weigh two or three pounds. They are taken in gill-nets, seines, and cast-nets. Eight men with a seine consider 10,000 a good day's take. Fresh fish find a ready market, and are shipped to Georgia and South Carolina in ice. Many are salted, and the roes cured. On the spot the fish are worth 2½ cents; roes 1 cent.

One of the most common fishes of the Gulf of Mexico is the red snapper (*Lutjanus campechianus*). It is gorgeously colored, averages 7 pounds weight, and lives in the strictly salt waters of the Gulf at depths of from 60 to 240 feet. Where there is a rock, coral, or gravel bottom this fish is sure to occur. The flesh is firm and sweet, and is good boiled, baked, broiled, or fried. It is caught with hook and line. Vessels carrying six to eight men go to sea with all appliances for both capture and preservation, and generally secure a load in about a week. The abiding places of the fish are found by sounding lines with baited hooks attached. The vessels are anchored over the spot or are allowed to drift across it, while the fishermen, each with a single line bearing two large hooks and loaded with several pounds of lead, work as rapidly as possible, for when the fish are hungry they bite as fast as the lines are lowered to them and even rise to the surface in their eagerness, biting at bare hooks or anything that is offered. This has given them the name of snappers. Yet at other times they take no notice of any bait or snare. The vessels go as far as 250 miles from home and 50 from shore. As the chief fishing-grounds of the Gulf are between Mobile Bay and Cedar Key, Pensacola is the most convenient shipping-point.

All the market fishing at Key West is done with hook and line. The great supply comes from bottom fishing, but some kinds are in the winter taken in large numbers by trolling. Among these are the king-fish (*Scomberomonus cavalla*), the dolphin (*Coryphœna hippurus*), the barracuda (*Sphyrœna picuda*), the amber jack (*Seriola lalandi*), the *albicore* (*Seriola dumerili*), the jack (*Caranx*) and the bonito, as well as the sword-fish or spike-fish (*Histiophorus*) and the wahoo (*Acanthocybium*). The king-fish, one of the mackerel tribe, is in season from the first of December to April.

The most abundant of the bottom fishes, in quantity exceeding all others, is the common grunt or ronco grande (*Hœmulon plumieri.*) Next to this comes the red grouper (*Epinephelus morio*), and then the different snappers (*Lutjanus*), groupers (*Epinephelus*), porgies (*Calamus*), and grunts (*Hœmulon*), each of which groups contain several species. The gray snapper, the yellow-tail, the lane snapper, the mutton fish, the schoolmaster, and the dog snapper are common species of *Lutjanus*; the common groupers are the red, the Nassau, the gag, the black, the scamp, the rockhind, and the coney; the common porgies, the jolt-head, the saucer-eye, the little-mouth, and the shad or grass porgy; and the common grunts, the sailor's choice, the yellow grunt or ronco amarillo, the tom-tate, and the French grunt, besides the more common ronco grande. Other food-fishes are the hog-fish (*Lachnolœmus*), the pork-fish (*Pomadasys*), the turbot (*Balistes caroliniensis*), and the jack, horse-eye jack, and runner (species of Caranx). Less abundant, yet frequently seen in the markets, are the blue-fish, the goat-fishes (*Upeneus*), the breams (*Diplodus*), the pompanos (*Trachynotus*), 3 species, the pudding-wife (*Platyglossus*), the Spanish hog-fish (*Harpe rufa*), the moon-fish (*Selene*), the Spanish mackerel (*Scomberomorus*), with several others. The "Whiting" of Key West is no relative of the cod, but is *Pomadasys chrysopterus*.

These fishes are all brought to the market alive, in the wells of the smacks, and killed by a blow on the head when sold.

In deeper water, another fish called the red grouper is the leading fish, and next comes the red snapper (*Lutjanus campechianus*), with several species of *Epinephelus*, including the gigantic Jew-fish or guasa.

Not a seine is owned on the island, but during the run of the mullets (*Mugil*), several species of that fish are taken in cast-nets, together with some other fishes.

The names given to fishes at Key West are still used for the same species in the Bahamas, whence they were brought, and also at the Bermudas. They were in use more than 150 years ago, at the time of the visit of Mark Catesby, and each name usually applies to but one species.

British America. East Coast.—The chief fishery of Newfoundland is that of the cod. (See COD, Vol. II.) The total exports of fishery products from Newfoundland to all countries in the year ending Dec. 31, 1883, was $6,498,727, of which $4,725,960 was for dry cod-fish, and $364,157 for cod-fish oil. About $1,000,000 for seal-skins, oil, etc., are included in this amount. Out of 1,163,934 quintals of cod-fish, Spain and Portugal received 573,181, Russia 295,094, and the West Indies 98,913. The value of the product of the Newfoundland fisheries imported by the United States in the same year was $393,114. There are along the coast of Labrador, between Manicoungan and Blanc Sablon (500 miles), several large fishing-establishments, whose yearly catch of cod amounts to over 1000 quintals, or hundred weights. In 1878 this coast furnished 160,500 quintals, but about 104,000 of these were taken by vessels from the United States, Newfoundland, etc.

The salmon-fishery is, in Labrador, next in importance to that of the cod. The fish are caught in gill-nets, with a regulation mesh of 6 inches. The season is from about July 25 to August 25. Fish are plentiful in all the rivers: there is seldom one without several fisheries upon it. The catch is prepared for market by cleaning, skinning, soaking in fresh water, and afterwards in brine, and packing in barrels. Twenty-three fishes usually fill a barrel, which is worth $12 cash, first cost. Drying, smoking, and canning are also practised. The rod and line can be used with good results. It is on record that one man caught, in this manner, 3861 pounds of salmon in 18 days.

In trout-fishing long and narrow nets are used, with meshes 3½ to 4 inches wide, so as to allow the young to escape. The fish taken average 12 to 18 inches long, and 3½ to 4 pounds weight. The net is set across the mouth or along the shore of some small bay into which a stream runs. Trout are taken at all seasons, but are always most abundant just before high tide.

Two or three species of herring appear in the Labrador waters late in April, or early in May. They are fished for with nets and seines till some time in June, when, having deposited their spawn, the fish return to deep water. These "spring herring" are poor and thin, and are largely fed to the dogs. The "fall herring" appear on the coast about the middle of August, and stay about six weeks. They are equal to the best Scotch herring. Sometimes the fish remain till October, and these later fish are generally fine. What is known as "weir-fishing" consists in making, at ebb tide, a barrier of young fir-trees driven into the mud. When full tide comes the fish are caught in the interlacing branches, and are left stranded by the retreating tide. The total value of the north shore or Labrador fisheries for 1880 was $1,401,289, of which the cod-fishery amounted to $1,200,000. In 1881 the catch of cod was nearly double that of 1880.

Besides the salmon-fishery of Labrador, salmon are extensively taken at Restigouche, and in the Bay of Chaleur, on the southern shore of the Gulf of St. Lawrence.

The total catch of salmon in Canada was given in the census returns at 3,263,200 pounds in 1871, and at 4,754,800 pounds in 1881. Of white-fish the quantities were, respectively, 4,754,800 pounds and 7,848,200 pounds.

Mackerel abound in the Gulf of St. Lawrence, but are rare in Labrador. They are taken from early in July to late in September.

Pacific Coast Fisheries.—The fisheries of the Pacific coast are at the present time of great importance, and only lack a wider market to become more so. In the extreme north, on the coast of Alaska and British Columbia, some of the leading fishes are identical with those of the Atlantic. Thus the cod and halibut are objects of special fishery. The streams and coasts of Alaska and British Columbia swarm with fish, and the Indians of the region are expert fishers.

The fisheries of British Columbia employed in 1884 10 steamers, 21 schooners, etc., and 1141 boats and canoes, giving occupation to 85 sailors, 1881 fishermen, and 1315 shore men. The total value of the yield was $1,358,267. The principal item was 541,242 cases (4 dozen pound cans) of canned salmon, but the list includes 367,000 pounds of smoked and 5636 barrels of salted salmon; 173,056 fresh salmon; sturgeon, 352,000 pounds; haddock, etc., 240,000 pounds, and 150,000 pounds of halibut.

The most important fishing industry of the Pacific coast is that of salmon-canning, carried on principally upon the Columbia, but to a considerable extent upon the Sacramento and other rivers. The first salmon-canning establishment was started on the Sacramento in 1864; and in 1865 the Columbia River salmon-fishery was commenced. The quality of the goods, and the convenient method of preservation adopted, in a few years enabled Pacific coast canned-salmon to make its way in all the markets of the world.

The salmon fleet of the Columbia now numbers about 1500 boats, with two men to each boat. The best material for a salmon net is Barbour's twine, made at Paterson, N. J. A single thread of this twine will bear a strain of 160 pounds. The season begins in April, and ends in August. The work of canning is principally performed by Chinamen, sometimes under the direction of an American superintendent. The salmon is placed in the cans raw, with some salt. The cans are covered, soldered, then boiled by steam-heat for an hour, and lastly, in order to cook the bones, placed for another hour in cylindrical iron retorts at a temperature of 133°. In 1884 the various establishments upon the Columbia put up 620,000 cases of salmon, each containing 48 cans. The total number of cases shipped from Portland to San Francisco in the season of 1884–85 was 82,984, while there were exported to England between Aug. 25, 1883, and Sept. 7, 1884, 409,727 cases, valued at $2,023,830.

The next important fishing-point on the Pacific coast is San Francisco. Here extensive fisheries are carried on in the bay and also in the Pacific. The fisheries of the bay have been greatly injured by over-fishing, by the use of small-meshed nets, which are still employed by the Chinese fishermen, and by the depredations of the flourishing colony of sea-lions which has for ages been established on a rock just outside of the bay, and was for several years protected by law.

The most abundant fishes of San Francisco Bay are one or two species of rock-fish or rock-cod (*Sebastodes*); the large sculpin, *Seorpaenichthys marmoratus;* two species of *Hexagrammus*, sometimes called sea-trout; the California smelts or silversides, some embiotocidæ, and the great sturgeon. Large quantities of salmon are canned on the Sacramento, the yield having been restored by the operations of the United States salmon-hatchery on the McCloud River. In the ocean are taken the various species of rock-cod, *Hexagrammus*, green-cod (*Ophiodon*), viviparous perch or embiotocidæ, sea-bass (*Atractoscion nobile*), and other sciænoids, together with herring, sardines, and several species of flat-fish, which are sold as sole, turbot, flounder, etc., though in no case specifically identical with the fishes of the North Atlantic rightfully so called. The fishes of the Central Californian coast are, as a whole, distinct from those of the northern region and also from those of Lower California. In Monterey Bay the two faunæ meet, and that point has thus the most abundant fish-fauna to be found on the Pacific coast of North America, and is also the seat of an active fishery. Farther south, at Santa Barbara, Wilmington, and San Diego, the character of the food-fishes becomes somewhat like that to be met with in the Gulf of Mexico, Serranidæ, Sparidæ, Sciænidæ, and Labridæ being prominent. (See FISH.)

The fresh-water fishes of the Pacific rivers belong chiefly to the Salmonidæ, Catostomidæ, and Cyprinidæ. Only one species of perch-like fishes exists. Most of the Cyprinidæ are large, are extensively eaten at Sacramento and other points in the interior, and are occasionally brought to San Francisco. Lake Tahoe yields a good supply of a large spotted trout, a variety of the widely distributed *Salmo purpuratus* or mountain trout, with which the "salmon-trout" of the Pacific coast is now believed to be identical. Sea-run specimens are more silvery, with finer spots and less red; they also grow larger. The species may always be known when fresh by a deep scarlet or crimson blotch on the membranes of the lower side of the lower jaw.

The exportation of fishery products (excluding whales, but including seals) from San Francisco in 1883 was not less than $4,000,000, or about 9 per cent. of the total exports of the city. Of this value $2,320,624 was for canned and $76,431 for pickled salmon. All other fish exports amounted to only about $140,000, the large remainder representing seal-skins, shrimps, abalones, etc.

The shad, carp, and Schuylkill cat-fish have been successfully introduced into the waters of California.

Other Fisheries.—The most important food-fish of the large rivers of the Eastern United States is the shad (*Clupea sapidissima*), a large and savory member of the herring family. This fish is systematically taken upon the Delaware, Hudson, Potomac, etc. In 1883 the Potomac fisheries alone yielded 379,816 shad and 8,989,261 fresh-water herring. Other fishes of which large quantities are taken are blue-fish, mackerel, mullets, rock-fish, spot, white, and yellow perch, pike, cat-fish, and trout.

Considerable indignation has recently been exhibited by the fishermen of the Middle States at the operations of the makers of fish-guano, who, it is alleged, have destroyed the fisheries of some localities, both by taking food-fish and by consuming in immense quantities fishes which are the food of better food-fishes. Some idea of the extent to which the business alluded to is carried on may be obtained from the fact that during the quarter ending Sept. 30, 1884, the number of menhaden taken to factories and rendered into oil and guano was 117,000,000, besides 5,000,000 used for manure. From these 585,000 tons of oil were manufactured, as well as 81,000 tons of soap. Of edible fish 230 tons were marketed. Two hundred and one sailing vessels and 29 steamers are employed.

The great interior system of rivers formed by the Mississippi and its tributaries, as well as the Great Lakes, are abundantly furnished with fishes which are the object of local fisheries. Among the most valued are the trout, bass, white-fish, and wall-eyed pike or perch (*Stizostedion*). The crowd of Cyprinidæ and Catostomidæ or suckers are less valued. On the Great Lakes the fish supply has been much diminished by incessant fishing. The black bass is scarce, and those taken to market often weigh only from half to two and a half pounds. The wall-eyed pike, which twenty-five years ago was common and large, reaching 15 lbs., is now said to be brought to market at 1½ to 2 pounds.

(W. N. L.)

Statistics.—The great extent of the fishing and marine industries of the United States may be seen from a mere enumeration of the classes into which they are divided by government officials. They are as follows:

A. *Ocean fisheries* (fishermen living on the vessels and making long voyages when necessary).—1, whale; 2, Antarctic seal and sea-elephant; 3, Grand Bank cod; 4, George's Bank cod; 5, Alaskan cod; 6, winter haddock; 7, fresh halibut; 8, salt halibut; 9, mackerel; 10, sword-fish; 11, hake and cusk; 12, red snapper and grouper; 13, menhaden; 14, herring and sardine industry.

B. *Coast fisheries* (chiefly from small boats).—15, New England shore cod; 16, mullet; 17, eel; 18, New England pound and trap; 19, lobster; 20, crab; 21, prawn and shrimp; 22, oyster; 23, scallop; 24, sponge; 25, sea-otter; 26, New England shore fishery; 27, Middle States shore fishery; 28, South Atlantic shore fishery; 29, Gulf shore fishery; 30, California shore fishery.

C. *River and lake fisheries.*—31, shad and alewife; 32, western salmon; 33, eastern salmon; 34, great lake white-fish; 35, smelt; 36, river sturgeon; 37, lake sturgeon; 38, great lake general fishery; 39, inland lake and creek fishery.

D. *Strand fisheries and shore industries.*—40, Alaska seal; 41, turtle and terrapin; 42, clam; 43, quahog; 44, abalone; 45, Irish moss industry; 46, marine salt industry; 47, seaweed industry.

The accompanying table, taken from the Census Report of 1880, was prepared under the direction of Prof. G. Brown Goode, of the United States Fish Commission, and is a faithful presentation of the work, value, and results of American fisheries of all kinds, so far as these admit of enumeration.

The nationality of the American fishermen, excluding 5000 Negroes and 8000 Indians and Esquimaux, and including all naturalized citizens engaged in the business, is 88 per cent. American, and, taking into account the various industries directly affected by the fisheries, it can be said that directly and indirectly this industry gives employment to and sustains not less than 1,000,000 persons in the United States. The vessels are models of marine architecture, combining great speed with admirable strength and sea-going qualities, and the men who man them are by habit and training, endurance and exposure, the hardiest and finest seamen on the ocean.

Treaties.—The importance, both national and international, of the various treaties relating to the North American fisheries requires that they should be considered at some length. They date back to the Treaty of Versailles, in 1763, when France yielded to Great Britain all of her possessions in North America, and afterwards at the Treaty of Paris, 1783, obtained the cession of the islands St. Pierre and Miquelon as fishing-stations. This treaty, by which the independence of the United States was recognized by Great Britain, was also definitive as to the rights of American fishermen, both on the ocean, over which Great Britain had no dominion whatever, and also in the waters adjacent to the shores, where her jurisdiction was unquestioned. It was a full acknowledgment, freely given, and was as much a warranted deed as the transfer of the territory of the United States. The article is as follows:

"It is agreed that the people of the United States shall continue to enjoy, unmolested, the right to take fish of every kind on the Grand Bank and on all other banks of Newfoundland; also in the Gulf of St. Lawrence, and at all other places in the sea where the inhabitants of both countries used at any time heretofore to fish; and also that inhabitants of the United States shall have liberty to take fish of every kind on such parts of the coasts of Newfoundland as British fishermen shall use, but not to dry or cure the same on that island; and also on the coasts, bays, and

FISHERIES OF THE UNITED STATES, 1880.

States.	PERSONS EMPLOYED.			APPARATUS AND CAPITAL.								VALUE OF PRODUCTS.		
				Vessels.			Boats.							
	Fishermen.	Shoresmen.	Total.	Number.	Tonnage.	Value.	Number.	Value.	Value of outfits.	All other capital.	Total.	General fisheries.	Menhaden fishery.	Total.
	No.	No.	No.			Dollars.		Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
New England	29,838	7,205	37,043	2,066	113,602.59	4,562,131	14,787	739,970	5,038,171	9,597,335	19,937,607	10,014,645	539,722	14,270,393
Middle States (exc. Great Lakes)	12,584	2,397	14,981	1,210	23,566.93	1,382,000	8,293	546,647	674,951	1,822,480	4,426,078	2,882,294	1,261,385	8,676,579
S. Atlantic States	38,774	13,644	52,418	3,014	60,886.15	2,375,450	13,331	640,508	1,145,878	4,789,886	8,951,722	2,217,797	315,680	9,602,737
Gulf States	4,382	749	5,131	197	3,009.86	308,051	1,252	50,173	52,823	134,537	545,584	713,594	. . . .	1,227,544
Pacific coast	11,613	5,190	16,803	56	5,463.42	546,450	5,547	404,695	467,238	1,330,000	2,748,383	4,792,638	. . . .	7,484,750
Great Lakes	4,493	557	5,050	62	1,768.87	183,200	1,594	83,400	766,200	313,175	1,345,975	1,784,050	. . . .	1,784,050
Alabama	545	90	635	24	317.20	14,585	119	10,215	7,000	6,400	38,200	74,325	. . . .	119,275
Alaska	6,000	130	6,130	. .	. . . .	. . . .	3,000	60,000	7,000	380,000	447,000	564,640	. . . .	2,661,640
California	2,089	1,005	3,094	49	5,246.80	535,350	853	91,485	205,840	307,000	1,139,675	1,341,314	. . . .	1,860,714
Connecticut	2,585	546	3,131	291	9,215.95	514,050	1,173	73,585	375,535	457,850	1,421,020	383,887	256,205	1,456,866
Delaware	1,662	317	1,979	69	1,226.00	51,600	839	33,227	70,324	113,080	268,231	309,029	941	997,695
Florida	2,284	196	2,480	124	2,152.97	272,645	1,058	28,508	39,927	65,037	406,117	426,527	. . . .	643,227
Georgia	809	90	899	1	12.00	450	358	15,425	18,445	44,450	78,770	84,993	. . . .	119,993
Illinois	265	35	300	3	209.73	8,500	101	2,000	11,900	61,000	83,400	60,100	. . . .	60,100
Indiana	45	7	52	1	21.90	2,500	15	1,650	20,210	5,000	29,360	32,740	. . . .	32,740
Louisiana	1,300	297	1,597	49	539.69	20,821	165	4,800	18,000	50,000	93,621	192,610	. . . .	392,610
Maine	8,110	2,961	11,071	606	17,632.65	633,542	5,920	245,624	934,593	1,562,235	3,375,994	3,576,678	. . . .	3,614,178
Maryland	15,873	10,135	26,008	1,450	43,500.00	1,750,000	2,825	186,448	297,145	4,108,850	6,342,443	479,388	11,851	5,221,715
Massachusetts	17,165	2,952	20,117	1,054	83,232.17	3,171,189	6,749	351,736	3,528,925	7,282,600	14,334,450	5,581,204	61,769	8,141,750
Michigan	1,600	181	1,781	36	914.42	98,500	454	10,345	272,920	60,900	442,665	716,170	. .	716,170
Minnesota	30	5	35	1	33.59	5,000	10	900	3,760	500	10,160	5,200	. .	5,200
Mississippi	110	76	186	.	. . . .	. . . .	58	4,600	1,600	2,600	8,800	12,540	. . .	22,540
New Hampshire	376	38	414	23	1,019.05	51,500	211	7,780	60,385	89,800	209,465	170,634	. . . .	176,684
New Jersey	5,659	561	6,220	590	10,445.90	545,900	4,065	223,963	232,339	490,000	1,492,202	949,678	146,286	3,176,589
New York	5,650	1,616	7,266	541	11,582.51	777,600	3,441	289,885	390,200	1,171,900	2,629,585	1,689,357	1,114,158	4,380,565
North Carolina	4,729	545	5,274	95	1,457.90	39,000	2,714	123,175	225,436	118,950	506,561	785,287	. . . .	845,695
Ohio	925	121	1,046	9	359.51	38,400	487	29,830	253,795	151,775	473,800	518,420	. . . .	518,420
Oregon	2,795	4,040	6,835	. .	. . . .	. . . .	1,360	246,600	245,750	639,000	1,131,350	2,776,724	. . .	2,781,024
Pennsylvania	511	41	552	11	321.99	10,500	156	13,272	40,538	55,500	119,810	132,550	. . . .	320,050
Rhode Island	1,602	708	2,310	92	2,502.77	191,850	734	61,245	138,733	204,850	596,678	302,242	221,748	880,915
South Carolina	964	41	1,005	22	337.32	15,000	501	9,790	25,985	15,500	66,275	192,482	. . .	212,482
Texas	491	110	601	. .	. . . .	. . . .	167	15,000	4,400	23,000	42,400	81,000	. . . .	128,300
Virginia	16,051	2,813	18,864	1,446	15,578.93	571,000	6,618	292,720	560,763	489,636	1,914,119	602,239	308,829	3,124,444
Washington	729	15	744	7	216.62	11,100	334	6,610	8,648	4,000	30,358	109,960	. .	181,372
Wisconsin	730	70	800	11	220.25	26,700	319	24,975	145,165	26,000	222,840	253,100	. .	253,100
Total	101,684	29,742	131,426	6,605	208,297.82	9,357,282	44,804	2,465,393	8,145,261	17,987,413	37,955,349	22,405,018	2,116,787	43,046,053

creeks of all His Britannic Majesty's dominions in America; and that the American fishermen shall have liberty to dry and cure fish in any of the unsettled bays, harbors, and creeks of Nova Scotia, Magdalen Islands, and Labrador as long as the same shall remain unsettled. But as soon as the same, or either of them, shall be settled it shall not be lawful for said fishermen to dry or cure fish at such settlement without a previous agreement for that purpose with the inhabitants, proprietors, or possessors of the ground."

The war of 1812, which was terminated by the Treaty of Ghent, Dec. 24, 1814, was claimed by Great Britain as a termination of the provisions of the Treaty of 1783, admitting Americans to the inshore fisheries, and, as the commissioners were unable to agree, no settlement relative to these fisheries was made. Following this England assumed jurisdiction of the entire British North American shore fisheries, including all bays, claiming authority over all waters three miles outside of a line drawn from headland to headland. American vessels were captured and driven out from this assumed line until, in 1818, Richard Rush, Minister to England, and Albert Gallatin, Minister to France, were empowered by the President to treat with Great Britain on the subject of the fisheries and other matters. The result of the conference was the Treaty of Oct. 20, 1818, Art. 1 defining the fisheries:

"Whereas differences have arisen respecting the liberty claimed by the United States for the inhabitants thereof to take, dry, and cure fish on certain coasts, bays, harbors, and creeks of His Britannic Majesty's dominions in America, it is agreed between the high contracting parties that the inhabitants of the said United States shall have forever, in common with the subjects of His Britannic Majesty, the liberty to take fish of any kind on that part of the southern coast of Newfoundland which extends from Cape Ray to the Ramean Islands, on the western and northern coasts of Newfoundland, from the said Cape Ray to the Quirpon Islands, on the shores of the Magdalen Islands, and also on the coasts, bays, harbors, and creeks from Mount Joly, on the southern coast of Labrador, to and through the straits of Belle Isle, and thence northwardly indefinitely along the coast; and that the American fishermen shall also have the liberty forever to dry and cure fish in any of the unsettled bays, harbors, and creeks of the southern part of the coast of Newfoundland, hereinbefore described, and of the coast of Labrador. But as soon as the same, or any portion thereof, shall be settled it shall not be lawful for said fishermen to dry or cure fish at such portion so settled without previous agreement for such purpose with the inhabitants, proprietors, or possessors of the ground. And the United States hereby renounce forever any liberty heretofore enjoyed or claimed by the inhabitants thereof to take, dry, or cure fish on or within three marine miles of any of the coasts, bays, creeks, or harbors of His Britannic Majesty's dominions in America not included within the above-mentioned limits: Provided, however, that the American fishermen shall be admitted to enter such bays or harbors for the purpose of shelter, or repairing damages therein, of purchasing wood, and of obtaining water, and for no other purpose whatever; but they shall be under such restrictions as shall be necessary to prevent their taking, drying, or curing fish therein, or in any other manner whatever abusing the privileges hereby secured to them."

The surrender made by the American commissioners fully justified the action of Great Britain, and the peculiar provision limiting American fishermen to shelter, the repairing of damages, purchasing wood, obtaining water, and for no other purpose whatever, put the power into the hands of the local authorities to deny them all commercial privileges, and it is upon this unwritten but implied definition that much of the existing troubles depend. Under the provisions of the Treaty of 1818 American vessels were subjected to constant annoyance, until it culminated in the seizure of the schooner Washington in the Bay of Fundy for fishing within said bay ten miles from the shore. This seizure was the subject of a special message from President Tyler to Congress in 1845, and after a long correspondence between Mr. Everett, the American Minister, and Lord Aberdeen the matter was referred to Joshua Bates, of London, who decided against Great Britain. This decision did not affect the headland theory, as the mouth of the Bay of Fundy is contiguous to American territory; but, without relaxing anything of her original claim, Great Britain modified her instructions to her officials, making three miles from the shore line the boundary of jurisdiction. The negotiation of the reciprocity treaty between Lord Elgin and Mr. Marcy followed shortly after, and the Treaty of 1854 admitted British fish free to the American market, and the freedom of the British waters was allowed to American fishing vessels.

This treaty was terminated in 1866 by the act of the United States and Canada instituting a license system by which she received—

In 1866,	from	454	vessels	at	50 cts.	per	ton,	$13,928
In 1867,	"	295	"	"	$1.00	"	"	15,714.92½
In 1868,	"	61	"	"	2.00	"	"	5,824.75
In 1869,	"	31	"	"	2.00	"	"	2,617.85½

While the license fee was 50 cents per ton, it was paid to be relieved from annoyance, and even $1 was paid, but when it was increased to $2 per ton it was more than the commercial privileges and the right to fish inshore was worth and the vessels could not afford to pay it. These were the seasons when mackerel were taken with the hook and line, before seines were generally used. After the repeal of the license act the provisions of the Treaty of 1818 were enforced to the letter, and in many cases beyond it, as it was publicly announced in the speeches in the Canadian parliament that the treaty was to be made aggressive until reciprocity was attained. This policy brought a strong message from President Grant, and nothing but the early arrangement of the Washington Treaty prevented retaliatory measures on the part of the United States. The Treaty of Washington, negotiated in 1871, and fully ratified in 1873, gave to American fishermen the right to fish inside of the three-mile limit without any enlargement of their commercial privileges; but it made provision for the Halifax Commission, which assembled at Halifax June 15, 1877. The object of this commission was to decide the relative value of the mutual concessions made by either government and name the amount to be paid in excess. The commission consisted of Sir Alexander T. Galt, on the part of Canada; Hon. Ensign H. Kelloge, on the part of the United States, and Maurice Delfosse, of Belgium, umpire. The British claim was for $14,880,000 for the privilege of fishing within three miles of the coast of the Dominion and Newfoundland. The claim of the United States was that the remission of duties on Canadian fish and oil with the privilege of free markets and free fishing on their coasts was more than an offset. It was apparent from the first that the British claim had a close relationship to the Geneva award of $15,000,000, allowed the United States for the depredations of the Alabama, and the award of $5,500,000 made by the commission in the light of subsequent history justifies the assertion. For the twelve years of the Washington Treaty 94,930 barrels of mackerel were taken within the three-mile limit, which sold in the United States for $778,582. This price includes the entire cost of production, salt, packing, barrels, inspection, and transportation. This is the entire benefit conferred by the treaty. The United States fishermen have paid the local British fishermen for herring bait-fish and ice over $2,000,000. The government of the United States has remitted to Canadian fishermen over $7,000,000 in duties, besides paying the $5,500,000 in gold as the award of the Halifax Commission.

As the number of bait weirs increase on the American coasts they, together with the squid taken by the vessels on the banks and other local means, are supplying the American fishermen with bait, so that the claim of Newfoundland as being the basis of the supply for the bank fisheries is fast becoming obsolete, and the only privilege desired at the present time by the American fishermen in Canadian ports is the same rights to buy and sell in Canadian ports that Canadian vessels have without restriction in American ports. The arbitrary and aggressive enforcement of the clause of the Treaty of 1818, by which American fishing vessels are not allowed to enter Canadian waters for any other purpose than for repairing damages, shelter, or to purchase wood and procure water, has been the cause of all the trouble in the vexed fishery question. Since the day of John Adams the United States has constantly lost in every fishery negotiation, owing largely to the selection of men for commissioners without any knowledge whatever of the concessions made or of the general subject to be discussed. The tariff of the United States prescribes a duty of ½ cent per pound on salt fish; $2 per barrel on mackerel; $1.50 per barrel on pickled fish; fish preserved in oil, 30 per cent.; fresh fish (iced or otherwise) and fish-bait being admitted free. Canada imposes a duty on all fish, fresh, salted, or smoked, of 1 cent per pound.

By the expiration of the fishery provisions of the Treaty of Washington, July 1, 1885, both tariffs went into effect. The notice of a desire to terminate the treaty was given by the United States at the earliest possible moment, and President Cleveland, in his first message, recommended the appointment of commissioners to negotiate a new treaty. The practical and producing element in the fisheries is not in favor of any further negotiations, as former precedents have universally sacrificed their interest.

The national necessity of maintaining the fisheries as a school and nursery for seamen is too apparent to be neglected. The foreign commerce of the country has largely passed from the hands of the American people, and the domestic coasting trade and the fisheries are the only marine resources on which to rely for a national marine militia, and it would now be suicidal to abandon national interest in the fisheries. The fisheries can furnish 60,000 men, the finest seamen in the world, for naval service. (F. J. B.)

FISH HAWK (*Pandion haliaëtus*), a species of the Falcon family widely spread in North America, and identical with the European osprey. It is distinguished from other birds of the family by the lack of aftershafts in its plumage, the peculiar conformation of its feet, the oiliness of its plumage, and its narrow, elongated form, all being adaptations to its habit of preying upon fish. The feet are large and strong, with naked tarsi, and very large claws. The wings are broad and powerful, and sharp-pointed at their extremities. In color, the under surface, with head and neck, is generally white, the upper surface a dark brown. The body is about 2 feet long, the wings more than 5 feet from tip to tip. The favorite haunt of the fish hawk is on the borders of the sea or of lakes, where it builds its huge nest of sticks and dried plants at the top of a dead or dying tree, the same nest being used year after year. When in search of prey the bird soars in broad easy curves above the surface of the water. On seeing a fish the wings are closed, and it darts downwards, as if by its weight only. Sinking for an instant below the surface it quickly reappears, grasping its slippery prey in its strong talons with such firmness, that cases are known where fish hawks have been drowned by seizing too heavy a fish, from which they could not extricate their claws. Shaking the water from its plumage, the hawk soars aloft, often to be robbed of its prey by the bald eagle. This pirate dashes at the overladen bird, and forces it to drop its prey, which the eagle darts after and seizes ere it reaches the surface of the water. The hawks, however, do not always submit quietly to this robbery, but wage war on the eagle, and often drive him from their haunts by force of numbers and perseverance. The fish hawk is migratory on the Atlantic coast, reaching the Northern States about the end of March, and leaving for the South in late September.

Osprey or Fish Hawk.

FISK, Wilbur (1792–1839), an American educator, was born at Brattleboro', Vt., Aug. 31, 1792, being the son of Judge James Fisk (1762–1844). He graduated at Brown University in 1815. After some study of law, he entered the ministry of the Methodist Episcopal Church in 1818. He became presiding elder of the Vermont district in 1823, and delegate to the General Conference in 1824. Though eminent as a pulpit orator, he exerted himself especially in the cause of higher education. When the Wesleyan University was founded at Middletown, Conn., in 1830, Dr. Fisk was chosen its president. He declined the office of bishop in 1836. For the sake of his health he went to Italy in 1835, and to England in 1836. He died at Middletown, Conn., Feb. 22, 1839. He published *Notes of Travel in Europe* (1838); *The Calvinistic Controversy* (1837), and other controversial treatises.

FISKE, John, an American author, was born at Hartford, Conn., March 30, 1842. He graduated from Harvard University in 1863, and studied law, but gave his chief attention to literature and philosophy. He lectured at Harvard University on philosophy 1869–71, and was afterwards assistant librarian until 1879. He has since been one of the overseers of the university, and has lectured in many places on history and philosophy. His publications include *Tobacco and Alcohol* (1868); *Myths and Mythmakers* (1872); *Outlines of Cosmic Philosophy* (1874); *The Unseen World* (1876); *Darwinism and other Essays* (1879); *Excursions of an Evolutionist* (1883); *The Destiny of Man* (1884); *The Idea of God* (1884); *American Political Ideas* (1885). Mr. Fiske is a profound thinker and a clear and brilliant writer. While a positivist in philosophy, he defends theism with marked ability. His discussions of American history are valuable contributions to the philosophy of history.

FITCH, Asa (1809–1879), an American entomologist, was born at Fitch's Point, Washington co., N. Y., Feb. 24, 1809. He was educated at Rensselaer Polytechnic Institute and afterwards studied medicine in New York and Albany. He was assistant professor of natural history in an expedition to Lake Erie in 1830. In 1831 he began the practice of medicine at Fort Miller, N. Y., removed to Stillwater in 1832, and returned to his native place in 1838. He then engaged in agriculture, and devoted much time to entomology, especially in its economic aspects. He contributed to Dr. Emmons' *American Quarterly Journal of Agriculture and Science* papers on the wheat midge, Hessian fly, etc. In 1854 he was made State entomologist, and his annual reports printed in the *Transactions of the State Agricultural Society* from 1854 to 1870 are his most valuable contributions to science. He died April 18, 1879.

FITCH, Ebenezer (1756–1833), an American educator, was born at Norwich, Conn., Sept. 26, 1756. He graduated at Yale College in 1777, and was afterwards tutor there, 1780–83 and 1786–91. A school at Williamstown, Mass., under his direction became Williams College, of which he was president from 1793 to 1815. He had been ordained to the ministry in 1795 and was pastor of the Presbyterian Church at Bloomfield, N. Y., from 1815 to 1827. He died at Bloomfield, N. Y., March 21, 1833.

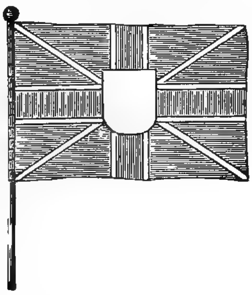
FITCHBURG, a city of Massachusetts, half-shire of Worcester county, is 50 miles W. of Boston. The north branch of the Nashua River runs through the city, and there are 10 bridges in the vicinity, three railroads—Fitchburg, Cheshire, and Old Colony—centre in the town. The principal buildings are the courthouse, Wallace Library, and art building. There are 6 hotels, 4 national banks, 3 other banks, 1 daily and 2 weekly newspapers, 11 churches, a high school, and 18 other schools. The industrial works comprise iron- and brass-foundries, paper-, woollen-, and cotton-mills, manufactories of shoes, saws, rock-drills, etc. The city is lighted with gas and has water-works. Its property is valued at $11,000,000, and there is a net debt of $640,000. The town was settled in 1730, and incorporated in 1764, when it was set off from Lunenburg. Rollstone Hill, 300 feet high, with several granite quarries, is in the most thickly settled part of the city. On top of the hill is a large boulder weighing 100 tons, and of different formation from any rock within 30 miles. Besides the city proper, Fitchburg includes 5 villages. Its population in 1870 was 11,260, and in 1880 was 12,429.

FIVE FORKS, a place in Dinwiddie co., Va., noted for a battle fought April 1, 1865, between the Union army under Gen. P. H. Sheridan and part of Gen. Lee's army. Here three roads met, the White Oak, Ford's, and the Dinwiddie C. H. road. As the

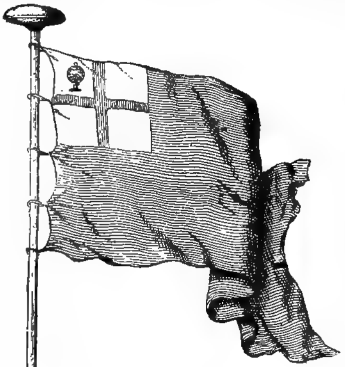
Southside Railroad could be reached by Ford's Road, Gen. Lee was anxious in prospect of leaving Richmond to retain this point, though it was nearly five miles from his main line. Gen. Sheridan had first attempted to take it on March 30, but had been driven back. Early on April 1 he renewed the attempt with about 13,000 men, first driving the Confederates into their works, then making a strong feint on his right, while the main attack by the Fifth corps under Gen. G. K. Warren was to be made on the left. The plan was carried out with great precision, but Gen. Sheridan, thinking that Warren had not been sufficiently prompt in his movements, removed him from command on the next day. The pursuit had been continued till dark, and 5000 prisoners were taken. The most important result of the battle was the evacuation of Petersburg April 2, followed closely by that of Richmond. The removal of Gen. Warren was afterwards the subject of a court of inquiry, and Gen. Sheridan's action was sustained as within his discretion. But many military critics exonerate Gen. Warren from any blame.

FLAG, the name given to several distinct endogenous plants, native to wet or marshy situations. It is mainly applied to members of the iris family, of which *Iris versicolor*, the large blue flag, is a plant with a stout stem, sword-shaped leaves, and large, showy flowers, of blue color, variegated with green, yellow, and white at base, and veined with purple. It is common in wet places, flowering in May and June. *I. Virginica*, the slender blue flag, has a slender stem with narrow leaves, and flowers much smaller than the preceding. It occurs in marshes from Maine to Virginia and southward, flowering in June. *I. cuprea* is a reddish-brown species, resembling *I. versicolor*, found in Illinois and southward. There are three species which grow only about six inches high, and bear blue flowers: *I. verna* and *I. cristata* in Virginia and southward, and *I. lacustris* on the great lakes. The violet-scented orris root of the shops is the dried rhizome of several European species. The sweet flag (*Acorus calamus*) is a plant of a different family, common to the United States, Europe, and Asia. It is the only native aromatic plant of northern climates, its creeping stem or rhizome having a warmly pungent taste. It is found on the borders of rivers and swamps, its stem from two to three feet high, the flowers densely crowded on a spadix, enclosed in a long, leaf-like spathe. The rhizome is used in the arts by perfumers and tanners, and is sometimes employed in medicine as a mild tonic and aromatic stimulant. The name flag is also given to certain flexible algæ, from their flag-like motion when stirred by the water.

FLAG, THE AMERICAN. The flags used by the American colonies prior to their separation from the mother country would naturally be those of England, though such does not appear to have been invariably the case. The red cross of St. George was without doubt hoisted over the Mayflower in 1620. Belonging to South Britain she may have displayed the king's colors from her main top, and a St. George's cross at the fore, as required by King James' proclamation of 1606. In November, 1634, we learn from the records of Massachusetts, complaint was entered "that the ensign at Salem had been defaced by cutting out one part of the red cross." When it was shown that "the mutilation complained of was done, not from disloyalty to the flag, but from an entire conscientious conviction that it was idolatrous to allow it to remain," the opinion of the ministers was asked, but they could not agree. The whole case was referred to the next general court, and the commissioners for military affairs in the meantime ordered that all ensigns should be laid aside. In the interim a flag having for an emblem the red and white roses was proposed, but in December, 1635, the commissioners appointed colors for every company, leaving out the cross, and appointing that the king's arms should be put into them. In 1643 the colonies of Plymouth, Massachusetts, and Connecticut were united in a league called "The United Colonies of New England." This union, the first on this continent, was declared to be perpetual, but no common flag was adopted until 1686, when Governor Andross received one from the king. This flag, as appears by a drawing of it in the British State-paper office, was the cross of St. George, borne on a white field occupying the whole flag, the centre of the cross emblazoned with a gilt crown over the cypher of the sovereign, James I. It was soon seen that a special flag to designate the merchant ships of the American colonies to distinguish them from the king's ships was desirable. An order was issued from the admiralty office, July 29, 1701, that merchant ships "wear no other Jack than that hereafter mentioned, viz., that worn by his majesty's ships, with the distinction of a white escutcheon in the middle thereof, and that said mark of distinction may extend itself to one-half the depth of the Jack, and on third part of the fly thereof according to the sample (drawing) hereunto annexed." The flag must have been worn by the American colonial vessels for many years, though we have no more than the official mention of it, and it is never depicted in the engravings of the time. A crimson flag, the Jack of which was a red St. George's cross on a white field, with sometimes a tree, at other times a globe, in the upper corner of the canton next the staff, was the ensign most generally in use in New England; occasionally the field or fly of the flag was blue. In a little book entitled *The Present State of the Universe* (London, 1704) there is a picture of a New England ensign with a tree in the canton. In a *Treatise on the Dominion and Laws of the Sea*, by Alex. Justice (London, 1705), there is a folding plate of national flags—one of which is a New England flag. It is difficult to say whether the device in the canton is a globe or a tree. Another work, 1701, has a representation of this New England ensign, and in still another there is a dark blue New England ensign with a white canton and red cross, having a globe in the upper corner of the latter. A French work on flags (La Haye, 1737) depicts and describes a *Pavillon de Nouvelle Angleterre en Amerique* "as *azure* on a canton *argent* quartered with the red cross of St. George, having a globe in the first quarter," in allusion to America, commonly called the New World. The departure from the authorized English flag and assuming standards of their own evinces a feeling of independence among the colonies. The absence of a desire for separation is evident in the allegiance implied by representing on them the colors of England, or, when from tenderness of conscience they were left out, the substitution of the arms of the king. In the newspapers for ten years preceding the commencement of our revolutionary struggle, liberty poles and trees, and Liberty and Union



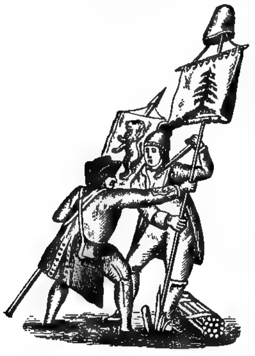
Colonial Flag.
Ordered for Merchant Service (1701).



PAVILLON DE LA NOUVELLE ANGLETERRE en AMERIQUE

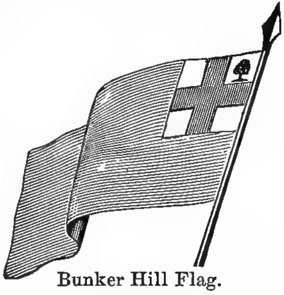
New England Flag (1737).

flags of various devices are frequently mentioned. These flags were party banners rather than colonial ensigns. On most of them the word "*Liberty*" was conspicuous. In the earliest days of the revolution each State seems to have set up its own particular banner. A green pine-tree was the favorite emblem of Massachusetts.

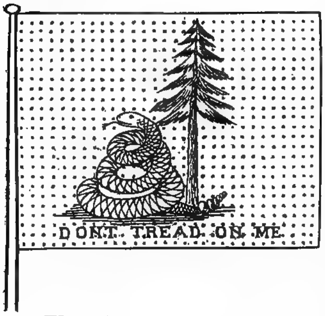


Pine-Tree Flag.
From a map published in Paris, 1776.

There were probably no colors worn by the handful of Americans hastily called together at the battle of Lexington, or on the night march to Bunker's Hill and into the battle the next morning, though tradition seems to assert the contrary. Trumbull in his celebrated picture of that battle, now in the Capitol at Washington, has represented a red flag having a white canton and red cross, and a green pine-tree. On July 18, a month after the battle, Putnam assembled his division on Prospect Hill and unfurled the scarlet standard of the Third Connecticut regiment just received, bearing on one side the Connecticut motto, "*Qui transtulit sustinet,*" and on the other the Massachusetts motto, "*An appeal to Heaven.*" The armed ships of New York had a black beaver on a white field for their flag. Those of Massachusetts and Pennsylvania carried a white flag on which was painted a pine-tree and the motto, "*An appeal to Heaven.*" In January, 1776, the American vessel Franklin, Capt. Samuel Tucker, wore the pine-tree flag. The first American flag displayed in the South was hoisted by Col. Moultrie on Fort Sullivan, afterwards named Moultrie for its gallant defender. It was a large blue flag with a white or silver crescent in the dexter corner, and the word *Liberty* blazoned across it. John Jay in a letter dated July, 1776, expressly states Congress had made no order at that date "concerning Continental colors, and that captains of armed vessels had followed their own fancies."

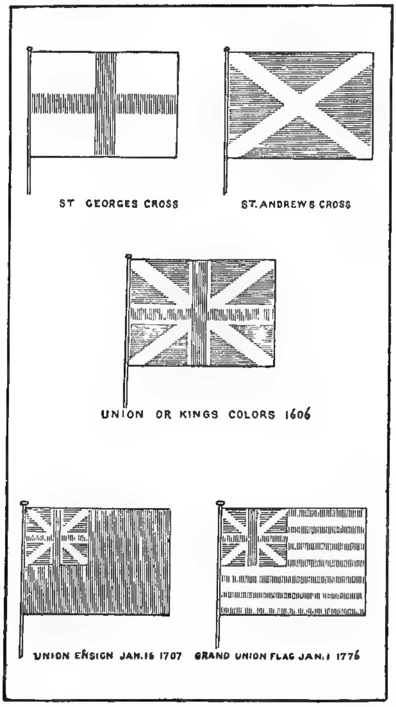


Bunker Hill Flag.
In Trumbull's picture.

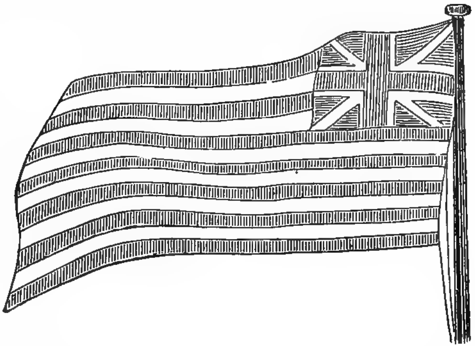

DON'T TREAD ON ME.

Flag of Massachusetts State Cruisers.

The first legislation of Congress on the subject of a federal navy was October, 1775. Notwithstanding the equipment of this fleet the necessity of a common national flag seems not to have been thought of until Dr. Franklin, Mr. Lynch, and Mr. Harrison were appointed to consider the subject and assembled at Cambridge. The result of their conference was the retention of the Union Jack, representing the yet recognized sovereignty of England, but coupled to 13 stripes alternate red and white, emblematic of the Union of the 13 colonies against its tyranny and oppression, in place of the loyal red ensign. This new striped flag was first hoisted Jan. 2, 1776, over the camp at Cambridge and was saluted with 13 guns and 13 cheers. The only contemporary drawing of this flag is in a picture of the schooner Royal Savage, of Arnold's Lake Champlain fleet, found among the papers of Gen. Schuyler. The Massachusetts council passed a resolution that the State colors should be "a white flag with a green pine-tree and the inscription '*An appeal to Heaven.*'" A portrait of "Commodore Hopkins, commander-in-chief of the American fleet, published Aug. 22, 1776, by Thomas Hart, London," has represented on the ships in the background, on one side a white flag with green tree and over it "Liberty tree," underneath the motto "*An appeal to God;*" at his other hand is a flag of 13 alternate red and white horizontal stripes with a rattlesnake undulating diagonally across them, and underneath the motto, "*Don't tread on me.*" This flag, as engraved, has no union, and it seems doubtful whether the first naval ensigns had one. Capt. Paul Jones, writing to Baron Vander Capellan, says: "I had the honor to hoist with my own hands the flag of freedom the first time it was displayed on the Delaware; and I have attended it with veneration ever since on the ocean."


ST GEORGES CROSS
ST. ANDREWS CROSS
UNION OR KINGS COLORS 1606
UNION ENSIGN JAN. 16 1707
GRAND UNION FLAG JAN. 1 1776

Formation of the Grand Union Flag of 1776.



Flag of the Royal Savage, 1776.

Jones' commission is dated Dec. 7, 1775, but as the flag is said to have been first hoisted when Esek Hopkins, the commander-in-chief, embarked on the ship Alfred, and his commission was not issued until the 22d, it is probable that Christmas or New Year's day was selected for its display. The latter date would bring it to the same time as the raising of the striped union flag at Cambridge. A gentleman, however, writing to the Earl of Dartsmouth from Maryland, Dec. 20, 1775, says: "An admiral is appointed, and on the 3d inst. the Continental flag was hoisted on board the Black Prince (the Alfred) opposite Philadelphia." Commodore Joshua Barney claimed to have been the first to hoist the new American flag in Maryland. The brig Lexington, Capt. John Barry, was credited with having first borne it on the ocean, but on examination Capt. Barry's papers show that he was detained in the Delaware, and that Hopkins' squadron, which left Philadelphia, January, 1776, and got frozen up in the Delaware at Reedy Island, was the first to wear it on the ocean, Feb. 17, 1776. The first achievement of the squadron under the Continental flag was the capture of New Providence, with 100 cannon and other stores. Hoisting over it the striped flag, they held it a few days, and on leaving, March 17, brought away the governor and one or two men of note. The Reprisal, a brig of 16 guns, was the first to show the flag in European seas. The first vessel to obtain a salute for this flag was the brig Andrea Doria on her arrival at St. Eustatia, Nov. 16, 1776. She saluted the Dutch flag, and her salute was returned by the governor, who was subsequently removed for his indiscretion. In August, 1777, the General Mifflin, wearing the *Continental* colors, was saluted at Brest to the indignation of the British ambassador. This is the second salute to the striped flag of which we have any account.

We have now arrived at the period when the striped Union flag of continental colonies received added beauty and new significance by the erasure of the blended crosses of St. George and St. Andrew, displaying in their place a canopy of stars and a blue field representing a new constellation.

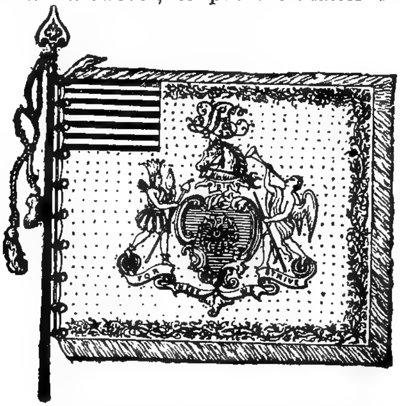
The earliest suggestion of stars as a device is found in the song written for the anniversary of the Boston massacre, and printed in the *Massachusetts Spy*, March 10, 1774:

> "The American ensign now sparkles a star,
> Which shall shortly flame wide through the skies."

It was probably a poetic flight and not designed by the writer to be prophetic. The earliest instance of the thirteen stripes being used upon an American banner is as a standard presented to the Philadelphia Troop of Light Horse in 1775, which is still preserved in the armory of that troop.

On June 14, 1777, nearly a year after the declaration of independence, the American Congress "*Resolved*, that the flag of the thirteen United States be thirteen stripes alternate red and white; that the union be thirteen stars white on a blue field, representing a new constellation." Thus without debate or previous legislation our flag was born and flung as a new constellation among the nations. A careful examination of the Rough and Smooth Journals of Congress and the files of the original drafts of nations shows this to have been the first, as it is the only record of the establishment of a national flag for the United States of America. This resolve was printed in the newspapers in August, but was not officially promulgated in Philadelphia until Sept. 3, and at other places still later. It will be observed the resolve does not prescribe how the stars are to be placed, or whether they shall have five, six, eight, or any other number of points, nor has the number of points been settled by any legislative enactment up to this time, though custom has established a star of five points, nor does it say whether the stripes are to be vertical or horizontal, though from the beginning they have invariably been horizontally placed. Paul Jones hoisted on the Serapis and Landais on the Alliance at the Texel in 1779, ensigns in which the stars had *eight* points, and the stripes of the flag of the Serapis were blue, red, and white, as appears from the official description preserved in the records of that place. As the arms of Washington are blazoned with stars and stripes it has been suggested that the design of our flag may have originated in a compliment to him, but Washington has not in his correspondence or writings mentioned any connection of his arms with our flag, as he would have been likely to do had there been any. The descendants of Mrs. Elizabeth, widow of John Ross, of Philadelphia, claim that she made the first pattern flag, and point to the house, still standing, No. 239 Arch street, as the place where it was made, and there is reasonable ground for the statement. Mrs. Ross was a flag-maker in Philadelphia, probably the only one; and, as appears by a bill in the *Pennsylvania Archives*, dated May 29, 1777, received 14*l.* 12*s.* 2*d.* for making ship's colors for the State navy of Pennsylvania.

The famous Paul Jones, commanding the Ranger, wrote to the naval committee of Congress, on Feb. 22, 1778: "I am happy to have it in my power to congratulate you on having seen the American flag, for the first time, recognized in the fullest and completest manner by the flag of France. The wind being contrary and blowing hard it was after sunset (on Feb. 13) before the Ranger was near enough to salute the La Motte Piquet with *thirteen* guns, which he returned with *nine*. However, to put the matter beyond a doubt I did not suffer the Independence to salute until the next morning, when I sent word to the admiral that I would sail through his fleet in the brig, and would salute him in open day. He was exceedingly pleasant, and returned the compliment also with nine guns." Jones had at first demanded gun for gun, but afterwards waived this point, when assured that the Admiral of Holland, then a republic, was saluted with nine guns, and the senior officer of the American republic was thus treated with the same respect.

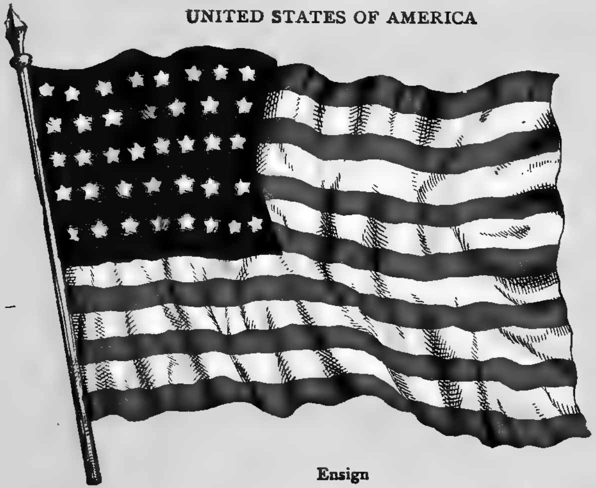


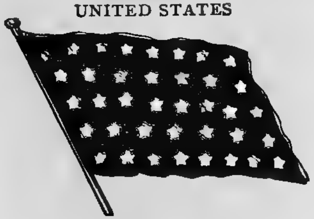
Philadelphia City Troop—First stripes.

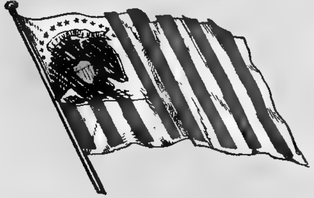
Jones also reported in his letter to the commissioners that in the action between the Ranger and Drake fought on April 24, 1778, when the latter hoisted English colors "the *American stars* were displayed on board the Ranger." This is the first recorded naval action under the new flag.

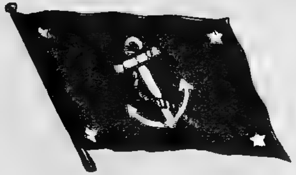
The first military incident connected with the stars and stripes belongs to Fort Stanwix, afterwards known as Fort Schuyler, and now the site of the town of Rome, N. Y., Aug. 3, 1778. When the enemy appeared before it the garrison was without a flag, but their patriotism and ingenuity soon supplied one. Sheets were cut up to form the white stripes, bits of scarlet cloth were joined for the red, and the blue ground for the stars was composed of a camlet cloak furnished by Capt. Abraham Swartwout. Before sunset this curious mosaic standard was floating over one of the bastions.

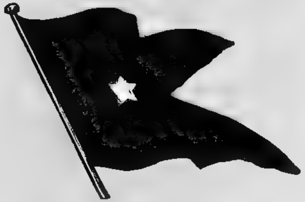
Beyond a doubt the stars and stripes were unfurled

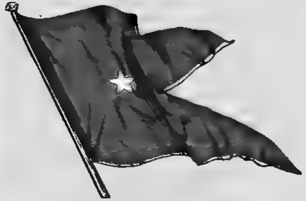

UNITED STATES OF AMERICA
Ensign

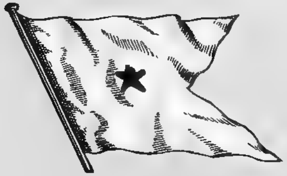

UNITED STATES
Union Jack

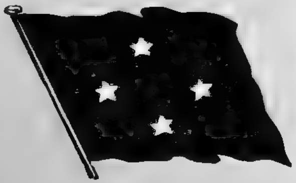

UNITED STATES
Revenue Flag

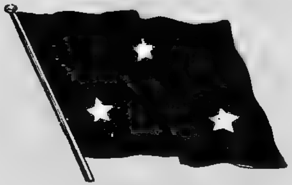

UNITED STATES
Flag of the Secretary of the Navy

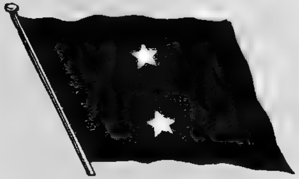

UNITED STATES
Commodore's Pennant

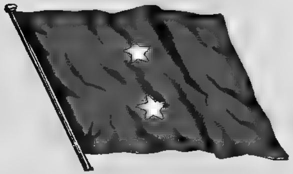

UNITED STATES
Commodore's Pennant

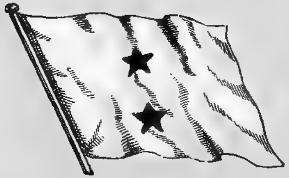

UNITED STATES
Commodore's Pennant

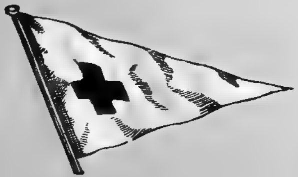

UNITED STATES
Admiral's Flag

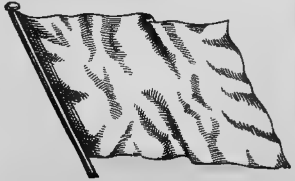

UNITED STATES
Vice Admiral's Flag

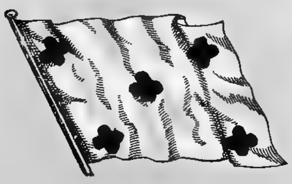

UNITED STATES
Rear Admiral's Flag

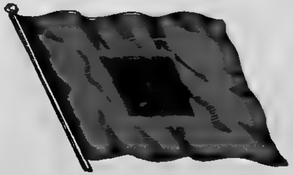

UNITED STATES
Rear Admiral's Flag

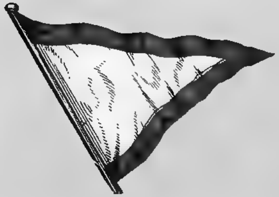

UNITED STATES
Rear Admiral's Flag

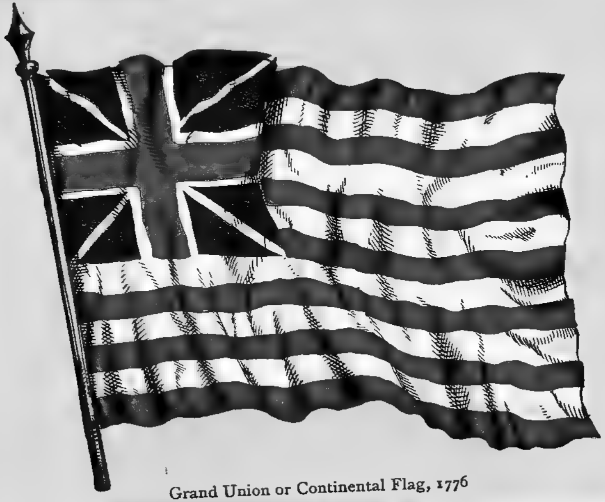

UNITED STATES
Church Pennant


UNITED STATES
Quarantine Flag

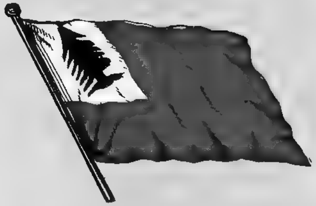

UNITED STATES
Naval Despatch Flag


UNITED STATES
Storm Signal

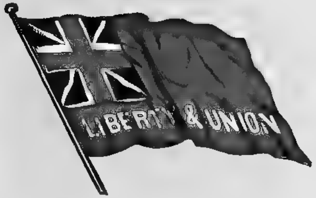

UNITED STATES
Naval Convoy Flag



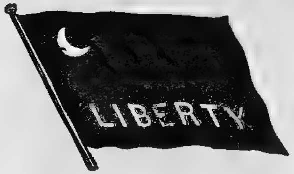
Grand Union or Continental Flag, 1776



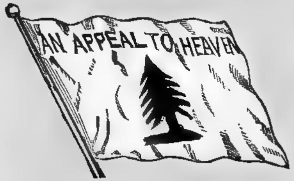
Pine Tree Flag



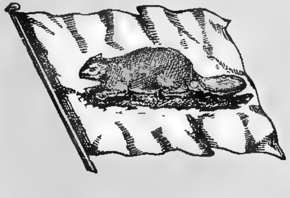
Liberty and Union, 1775



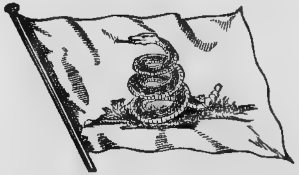
South Carolina, 1775



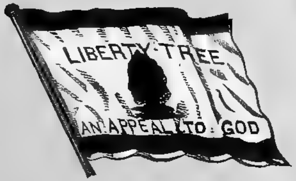
Massachusetts, 1775



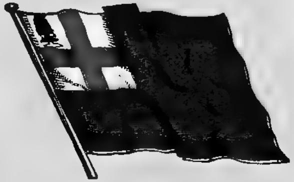
New York, 1775



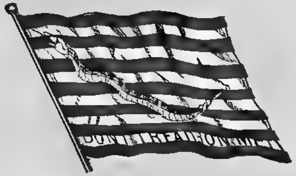
Pennsylvania Navy, 1776



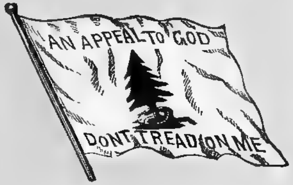
New England Navy, 1776



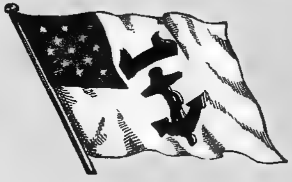
Bunker Hill Flag



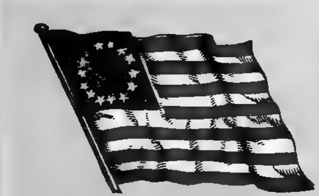
Com. Hopkins' Flag, 1776



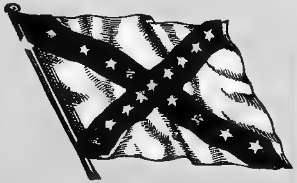
Proposed Continental Flag, 1777



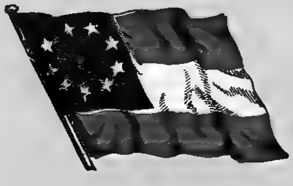
Rhode Island, 1783



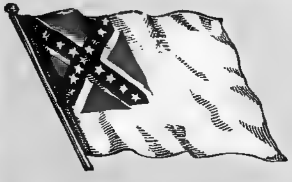
Flag of 1777



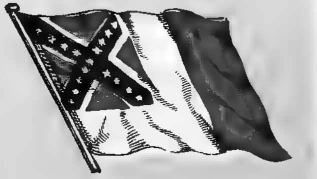
Confederate Battle Flag



Confederate, 1861



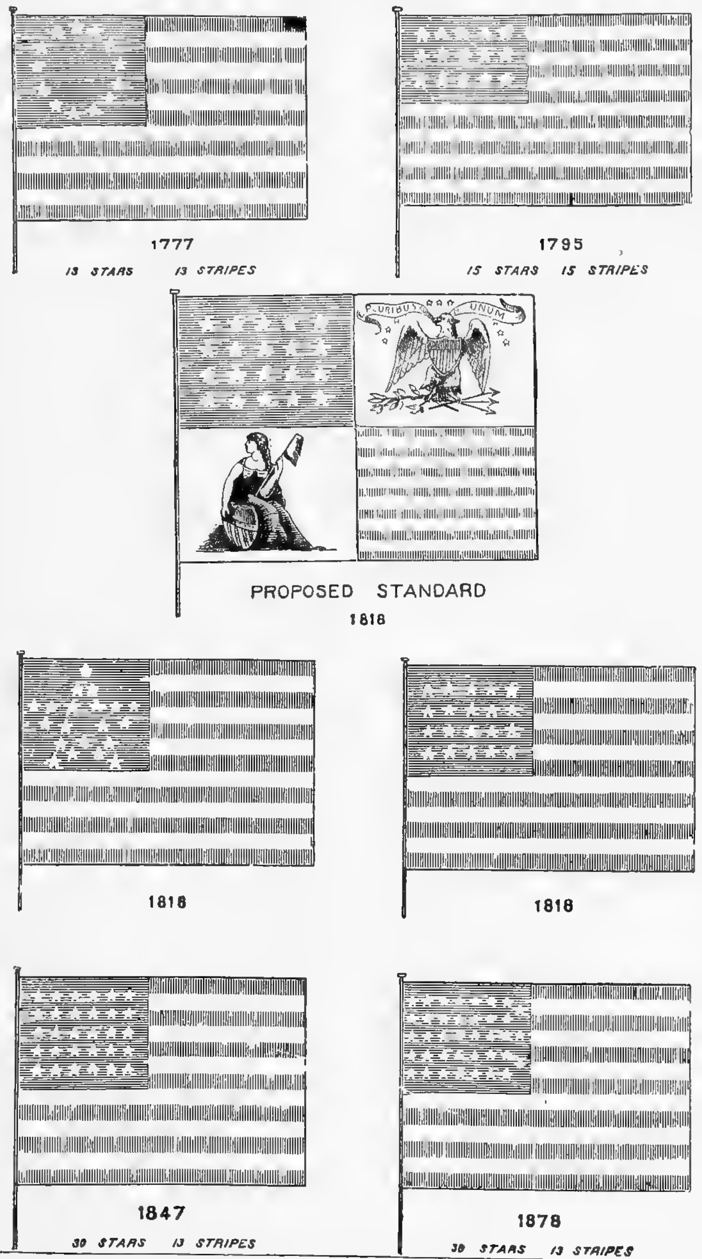
Confederate, 1863



Confederate, 1864

at the battle of Brandywine, Sept. 11, 1777, and at Germantown the 4th of Oct., and witnessed the surrender of Burgoyne at Saratoga, Oct. 17, 1777, and the sight of the new constellation helped to cheer the patriots of the army amid their suffering around the camp-fires at Valley Forge. They waved triumphant at Yorktown, Sept. 19, 1781, looked down upon the evacuation of New York, Nov. 25, 1783, and shared in all the glories of the latter days of the revolution.

THE STARS AND STRIPES. 1777–1878.



On Jan. 28, 1778, they waved for the first time over a foreign fortress, when Capt. John Rathburne, of the sloop-of-war Providence, landed at night 25 men on the island of New Providence and took possession of Fort Nassau, hoisted the stars and stripes over it, and held possession of it two days.

The independence of the United States of America having been recognized by Great Britain, the stars and stripes became henceforward the recognized symbol of a new nation, and their history is an exhibit of its military, naval, civil, and commercial progress.

The honor of having been first to hoist the stars and stripes in a British port has been claimed for several vessels, but must be assigned to the ship Bedford of Nantucket, which arrived at the Downs, Feb. 3, 1783, passed Gravesend the same day, and reported at the London custom house on the 6th. The honor of displaying our flag first in England must be awarded to Copley, the American painter, who, after listening to King's speech, recognizing the United States of America, Dec. 5, 1782, returned to his studio, and added to a ship in the background of a portrait of Elkanah Watson the stars and stripes. The ship Empress of China, of 360 tons, was the first vessel to carry the flag into the Chinese Sea. The ship Franklin, of Salem, Mass., was the first to carry it to Japan, 1798–99. The first to carry it around the world was the ship Columbia, Capt. Gray, 1789–90.

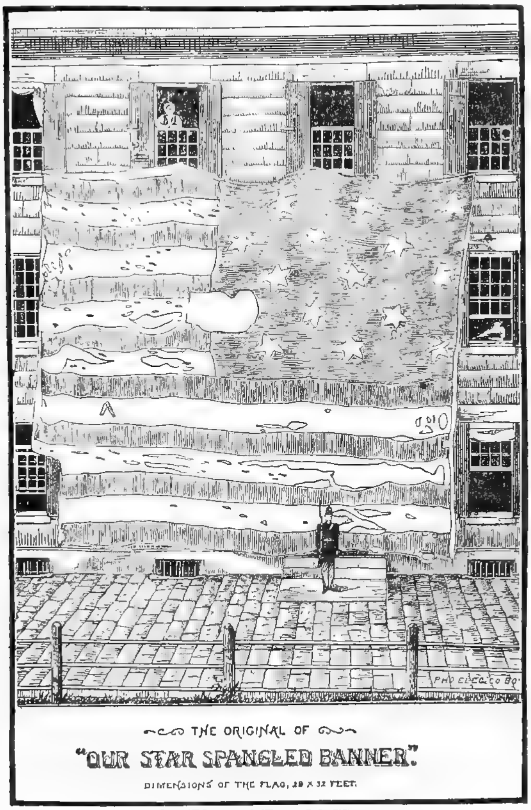
In 1794, in consequence of the admission of the new States, Vermont (1791) and Kentucky (1792), an act was passed increasing the stars and stripes on our flag from 13 to 15, to take effect May 1, 1795. This was the flag presented to the National Convention of France. It was worn by our ships in 1798–99 during the quasi war with France, and throughout the war of 1812–14, in all our battles, whether by land or sea, and was hoisted by Commodore Porter over Nookahiva or Madison Island, in the South Pacific, when he took possession of that island, Nov. 19, 1813.

The revenue flag of the United States was created by an act of Congress, March 2, 1799, which directed the president to prescribe an ensign and pennant for the revenue cutters and boats. Accordingly on Aug. 1 it was ordered that the ensign should consist of *sixteen* perpendicular stripes, alternate red and white, and the union bear the arms of the United States in dark blue on a white field.

The stripes represent the number of States in the Union, when this flag was prescribed, and the ensign has undergone no change since. In 1871 thirteen blue stars, in a white field, were substituted for the eagle in the union of the revenue pennant. Whenever revenue vessels are employed beyond our coast, or in conjunction with the navy, they are allowed to wear the national ensign.

On April 27, 1805, Lieut. O. Bannon of the marines hoisted over the Tripolitan fortress of Derne the first American flag planted upon a fortress of the Old World.

The flag of Fort McHenry, whose "broad stripes and bright stars'' inspired Francis Scott Key to write our national song, "The Star Spangled Banner,'' still exists in a tolerable state of preservation, and is in the possession of Mr. Eben Appleton, of Yonkers, N. Y., a grandson of Colonel Armstead, the gallant defender of Fort McHenry. It is a flag of 15 stars and 15 stripes; the broad stripes being each 2 feet wide, and its bright stars 2 feet from point to point. The flag is 30 feet wide, and was originally beyond doubt 40 feet long, but in its present curtailed dimensions is only 32 feet long.


PHO ELEC CO BO
THE ORIGINAL OF
"OUR STAR SPANGLED BANNER."
DIMENSIONS OF THE FLAG, 29 X 32 FEET.

The Flag of Fort McHenry.

The admission of the new States of Tennessee, Ohio, Louisiana, and Indiana made a change in the flag desirable. Accordingly, on the admission of Indiana in 1816, it was resolved "that a committee be appointed to inquire into the expediency of altering the flag of the United States.'' While this committee had the matter under consideration, Capt. S. C. Reid, famous for his defence of the privateer General Armstrong in Fayal Roads, was requested to make a design for our flag, which would represent the increase of States without destroying its distinctive character. Capt. Reid at once recommended that the stripes be reduced to the original *thirteen*, and that the stars should be increased to the number of States, and formed into one great star, whose brilliancy should represent their Union; also that a star should be added to this constellation for every new State admitted. Accordingly, after considerable debate, it was enacted by Congress

> "That from and after the fourth day of July next the flag of the United States be thirteen *horizontal stripes*, alternate red and white; that the union have twenty stars, white, in a blue field."
>
> And "That on the admission of every new State to the Union one star be added to the union of the flag, and that such addition shall take effect on the fourth of July next succeeding such admission."

This act was approved April 4, 1818. It prescribes, for the first time, that the stripes shall be horizontal, but does not designate the number of points the stars shall have, or how they must be placed in the union. Custom, however, has settled upon the stars being five-pointed, but the placing of the stars, whether in the irregular form of a constellation—as seems to have been the intent of the resolution of 1777, establishing the flag—or in a circle significant of an endless Union, or formed into one bright star, or arranged in parallel lines, or in any fanciful shape is still left a matter of choice and taste. The first flag flung to the breeze, under the new law, was made by Mrs. Reid, the wife of its gallant designer, and had the stars arranged as one great star. It was hoisted over the United States House of Representatives, April 14, 1818, though the law was not to go into effect until the 4th of July. The flags of the military department of our government have mostly had the stars similarly arranged. By direction of the President, orders were issued, May 18, 1818, and reiterated in September that the stars in "the flag to be worn by the vessels of the United States, and at our naval stations,'' should be arranged in parallel lines, and that order has never been rescinded. The new flag was first hoisted and saluted at our naval stations on the 18th of September, 1818.

The first State to add a star to the constellation of the new flag was Illinois, admitted Dec. 3, 1818. The original constellation has increased from 13 to 38; should this increase of States continue, as is inevitable, some new symbol will have to be adopted, as the stars of the union have already dropped from those of the first magnitude, and become indistinct and confusing.

WORKS ON THE FLAG.—*The History of the National Flag of the United States.* By Schuyler Hamilton, U. S. A. (Phila., 1853. Pp. 115.)

The History of Our Flag. By Ferdinand L. Sarmiento. (Phila., 1864. Pp. 96.)

Our Flag—Origin and Progress of the Flag of the United States. With an introductory account of the flags of ancient and modern nations. By George Henry Preble, U. S. N. (Albany, 1872. Pp. 535.)

Our National Flag—Its History in a Century. By General Schuyler Hamilton. (In the American Magazine of History, July, 1877.)

The History of the First United States Flag and the Patriotism of Betsey Ross. By Colonel J. Franklin Reigart. (Harrisburg, 1878. Pp. 25.) A worthless book.

History of the Flag of the United States of America and of the Naval and Yacht Club Signals, Seals, Arms, and Principal National Songs of the United States. By George Henry Preble, Rear Admiral U. S. N. Revised edition. (Boston, 1880. Pp. 814.) Third revised edition of the same illustrated with plates, engravings, maps, and autographs. (Boston, 1882.)

(G. H. P.)

FLAGET, BENEDICT JOSEPH (1763–1850), an American prelate, was born at Contournat, France, Nov. 7, 1763. He was educated at the College of Billon and the University of Clermont, and spent three years in theological study at Issy. After being ordained priest in 1789, he was made professor of dogmatic in the seminary at Nantes. On the outbreak of the French Revolution he emigrated to America, arriving at Baltimore in March, 1792. Bishop Carroll assigned him to the mission at Vincennes, Ind., which he reached on Christmas day. After more than two years of arduous labor he was recalled to become professor in Georgetown College. He was afterwards transferred to St. Mary's College, Baltimore. On Nov. 4, 1810, he was consecrated bishop of Bardstown, Ky., and arrived at that place June 9, 1811, making his first abode in a log-cabin. There being only seven priests in the vast diocese, Bishop Flaget had to make long journeys to supply the wants of his people. In 1819 the increase of the Roman Catholic population had made a coadjutor necessary, and Father David was appointed. In 1822 the diocese of Cincinnati was formed, Right Rev. E. D. Fenwick being its first bishop. In September, 1828, Bishop Flaget attended the first provincial council at Baltimore. In 1834 the diocese of Vincennes was formed. Dr. G. Bruté being the first bishop.

Within twenty-five years Bishop Flaget established four colleges, three religious sisterhoods, a brotherhood, two religious orders, an orphan asylum, an infirmary, and eleven academies. Going to Europe in 1835, he spent four years chiefly in France. In 1841 his episcopal see was changed to Louisville, and after the death of his first coadjutor he was able, in September, 1848, to consecrate as second Right Rev. M. J. Spalding, this being the last official act of his career. However, he witnessed the laying of the corner-stone of the Louisville Cathedral, Aug. 19, 1849. He died Feb. 11, 1850.

FLAGG, George Whiting, an American artist, was born at New Haven, Conn., June 26, 1816. He spent his boyhood in Charleston and early evinced a love of art. He studied under the care of his uncle, Washington Allston, in Boston, and afterwards spent three years in further study in Europe. He resided in London for six years, devoting himself chiefly to portrait painting. After his return to New Haven he painted some historical scenes, among which are Landing of the Pilgrims, Landing of the Atlantic Cable, Washington Receiving his Mother's Blessing, Columbus and the Egg.

FLAGG, Jared Bradley, an American artist and clergyman, was born at New Haven, Conn., June 16, 1820. He is a brother of G. W. Flagg, with whom he studied. In 1836 he exhibited at the National Academy a portrait of his father. He settled at Hartford, where he painted portraits, but in 1849 removed to New York. He afterwards studied theology, and in 1854 was ordained in the Episcopal Church. He has had charge of several churches, but has still given time to art. His portrait of Commodore Vanderbilt was at the Centennial Exhibition in Philadelphia.

FLAGG, Wilson (1805–1884), an American naturalist, was born at Beverly, Mass., Nov. 5, 1805. He was educated at Phillips Academy, Andover, and Harvard College, but did not graduate. He contributed to the *Atlantic Monthly* and other periodicals. His publications include *Studies in the Field and Forest* (1856); *Woods and Byways of New England* (1872); *Birds and Seasons of New England* (1874). In 1881 the latter two were enlarged and republished under the titles *Halcyon Days*, *A Year with the Birds*, and *A Year with the Trees*. Mr. Flagg was an ardent lover of nature, a careful observer, and enthusiastic writer. He died at North Cambridge, Mass., May 6, 1884.

FLAGSTONE, thin layers of stone, cut or split, much used in American cities for sidewalks. A stone is usually employed for this purpose that splits naturally into layers of 2 to 4 inches thickness and smooth enough to need little surface-dressing. They are used in sizes of from 10 to 100 or more square feet of area. Laminated sandstones are ordinarily chosen, but mica slate, hornblende slate, or granite are frequently employed. Limestone sometimes splits well, but becomes slippery by wear. The harder veins of slate quarries are also used, but are not very durable. The fine-grained sandstone used in New York, known as *bluestone*, is one of the best of flagstones. Recently an artificial stone, made of asphalt and other materials, has come into common use and bids fair to supplant the employment of the natural stone for this purpose.

See Vol. IX. p. 249 Am. ed. (p. 286 Edin. ed.).

FLAMINGO, the common name of a remarkable genus of birds (*Phœnicopterus*), comprising about seven tropical species, of which four are American. The Red flamingo (*P. ruber*) is the only one that visits the United States, it being found in Florida and on the borders of the Gulf States. These birds are remarkable not only for their brilliant scarlet color, but for their extreme length of neck and legs, and the peculiar form of the bill, which is used with the upper mandible turned downwards in feeding. They present external features of both the wading and the swimming birds, and have been placed in both groups, but their organization most nearly approaches that of the duck tribe. The Red flamingo stands nearly 5 feet high, the length of the body being about 4 feet, and spread of wings 5 feet. It weighs from 6 to 8 pounds. It seeks its food in the mud of river borders, where the birds stand in long lines, with posted sentinels, who give warning of danger by a trumpet-like note. The nest is made in irregular heaps of mud, 2 or 3 feet high, scratched up in the salt ponds, and entirely surrounded by water. Two eggs are usually laid, and the young, whose color is nearly white, are said to take to the water as soon as they are hatched. The hen's strange habit of standing while hatching her eggs is shown in the accompanying cut.

Flamingoes on their nests.

FLAMMARION, Camille, a French astronomer, was born at Montigny-le-Roi, Feb. 25, 1842. After entering on a course of theological study he turned his attention to astronomy, and became an assistant in the Observatory at Paris. Retiring in 1865, he devoted himself to the popularization of science in newspapers and books. A mystical vein in some of his writings has helped their popularity. Among the principal publications are: *La Pluralité des mondes habités* (1862); *Les mondes imaginaires et les mondes réels* (1864); *Les Merveilles célestes* (1865); *Histoire du ciel* (1867); *L'Atmosphere* (1871). He made many balloon ascensions for the study of aerial phenomena, as described in his *Voyages aériens* (1868).

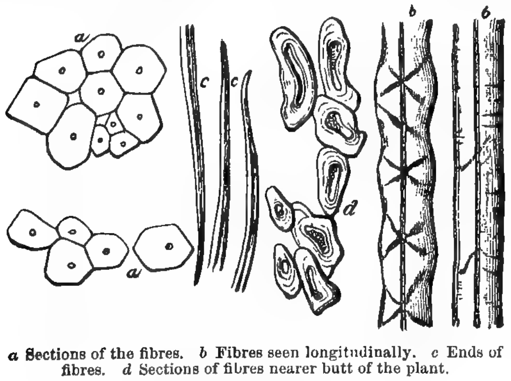
FLANDERS, Henry, an American lawyer and author, was born at Plainfield, N. H. He is a prominent lawyer of Philadelphia. He has published treatises on *Maritime Law* (1852), *Law of Shipping* (1853), *Principles of Insurance* (1871), and other legal topics. He is also the author of the *Lives and Times of the Chief Justices of the United States* (2 vols., 1855–58), a standard work; and of *Memoirs of Cumberland* (1856).

FLATHEAD INDIANS, a popular name for the Selish, or Hopilpo, a tribe of North American Indians inhabiting the middle valley of the Columbia, and at present occupying mainly a reservation on the Jocko River, and on the Northern Pacific Railroad, in the north-west part of Montana. A considerable number of Flatheads have refused to go upon this reservation, but remain in their old home in Bitter Root Valley, surrounded by whites. The Selish proper are all Catholics, and are among the best and most intelligent of the native North American peoples. They do not flatten the heads of their children, and appear never to have done so; the name Flathead being at first applied to them by mistake. They are the representative tribe of the great Selish family of the Columbia Valley. On the Flathead reserve are found many Kootenai Indians and the Pend d' Oreilles (Kalispel or Kalispelm Indians), both speaking Selish dialects. Other tribes of the Selish stock are the Kwantlum and Haitlin, of British Columbia; the Shushwaps, Okanagans, Spokanes, the numerous small Nesqually tribes of Puget Sound, and the Chehalis of the Pacific coast. Father G. Mengarini's *Selish Grammar* (1861), his MS. dictionary, and the Jesuit fathers' *Kalispel Dictionary* (1879), are the best sources of information regarding the very difficult languages of this group of tribes. See also George Gibbs' vocabularies of the Lummi and Clallam languages, which are regarded as of the Selish stock, though another so-called Clallam language is assigned to the Haidah group.

The practice of flattening the heads of infants was once widely prevalent among American Indians. The ancient Mexicans and Peruvians, the Caribs, the Natchez, the Chickasaws, Choctaws, and other tribes formerly compressed the heads of children either sidewise or on the forehead. Latterly the custom has prevailed among the Klicketals (Sahaptin or Nez Percé stock), and several of the Chinook or fish-eating tribes of the Lower Columbia Valley. The infant's head was compressed either by tying a flat piece of wood or a bunch of grass across the forehead. The Choctaws used a sand-bag for the same purpose. The practice is said not to have interfered with the health or intelligence of children upon whom it was practised; and the resulting deformity diminished to a greater or less degree, as adult life was approached.

See Vol. IX. p. 256 Am. ed. (p. 262 Edin. ed.).

FLAX, the name given to both the plant and the fibre of *Linum usitatissimum*, the basis of the linen manufacture, and of the flax-seed and the linseed-oil industries. The plant grows from two to over three feet in height, and bears small lanceolate leaves and bright blue flowers, which yield seed vessels containing each ten seeds. It has been very long cultivated for industrial purposes, and is now widely grown in Europe, Asia, and America, being congenial to a considerable diversity of soil and climate. For profitable cultivation it needs a good, deep soil, well drained and fertilized, though too much manure gives coarseness to the fibre. The seeds are sown broadcast during April or May, and much more thickly for a fibre than for a seed crop. The after culture is chiefly confined to weeding. If grown for fibre the plant is pulled up by the roots when the seeds begin to ripen; if for seed, when the stem is growing yellow and the leaves begin to fall. The after preparation consists in a process of *rippling*, with a sort of iron comb, to secure the seed; *rething*, or steeping in water, to produce fermentation and separate the fibre; breaking and *scutching*, to remove all woody particles; and *heckling*, by which the fibre is combed out, straightened, and the longer threads or *line* separated from the woolly mass of *tow*.



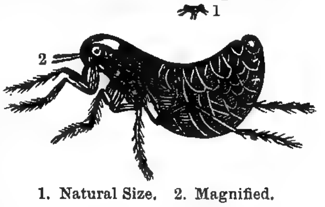
a Sections of the fibres. *b* Fibres seen longitudinally. *c* Ends of fibres. *d* Sections of fibres nearer butt of the plant.

Fibres of Flax (*Linum Usitatissimum*).
Magnified 275 times.

The use of flax fibre in linen-weaving is but one of the important results of flax cultivation. The seed is highly nutritive, and is beneficial to every species of animal. Given to calves in the form of a jelly, mixed with other substances, it is an excellent substitute for milk. It also yields about 22 per cent. of the highly valuable linseed oil, while the residue of the pressed seed is a valuable food for cattle, used alone or mixed with fodder. It is known as linseed meal or oil-cake. There is an enormous demand for both the fibre and the oil, yet of late years flax-culture has been neglected in America. In the early years of this country flax was a standard American farm-product, and continued so till the cotton-culture rose into importance. The fibre was prepared on the farm, and spun into cloth by the women of the family. But flax-culture was attended with much unpleasant labor, while its profits were small, and less attention has been paid to it since cotton goods have come largely into use. Recently, however, this labor has been much reduced. The old method was to pull the plants by hand. Now, reapers, or flax-pulling machines, have come into use. At present, however, flax is mainly grown in this country for seed, and its cultivation for fibre has greatly decreased. In 1870 the product of fibre amounted to 27,133,034 lbs., of which nearly 18,000,000 lbs. were produced in Ohio; and of seed 1,730,444 bushels, more than one-third of which came from Ohio. In 1880 a marked change is observable, the seed product being 7,170,951 bushels, and the fibre being reduced to 1,565,546 lbs. The centres of cultivation have also changed, the most important seed-raising States in 1880 being Illinois, Iowa, and Indiana, while New York is credited with more than one-half of the total product of fibre.

See Vol. IX. p. 262 Am. ed. (p. 300 Edin. ed.).

FLEA, a genus of wingless insects now ordinarily classed in the family *Diptera*, though it has been difficult to fix their true relations. They live by sucking the blood of various animals, on which they are, to a certain extent, parasitic. Several of our domestic animals are infested by species peculiar to themselves, those of the cat and dog, for instance, being, fortunately, very little disposed to attack man. All the species are very similar to the common *Pulex irritans*, which is found in all parts of the world, and is in some of the warmer countries an intolerable nuisance. Several of the European countries, such as Turkey and Italy, are the homes of countless myriads of fleas, as travellers find to their cost. The northern parts of the United States are not seriously affected by them in any place where reasonable cleanliness prevails. During the Centennial Exhibition, for instance, part of the Italian exhibit was a plentiful importation of fleas, which spread over Philadelphia, and proved a serious annoyance for a year or two. Yet they quickly vanished before careful housekeeping. Fleas have long been noted for their remarkable muscular powers, being able to leap to an astonishing distance, and to thirty-six times their own height. Their strength has been taken advantage of in exhibitions of so-called educated fleas, in which the only education is in the effort of the animal to escape from its tormentors. The most annoying of American species is the tropical *Pulex penetrans*.



1. Natural Size. 2. Magnified.

The Common Flea.

called by the natives chigoe, jigger, bicho, chique, or pique. The female of this species penetrates the feet, particularly beside the nails, where it becomes distended with eggs to the size of a pea, causing distressing and often dangerous sores.

FLEABANE, the common name given to various herbs belonging to the order *Compositæ*, and especially to the genus *Erigeron*, from their supposed power to drive away fleas. Several American species bear this common name, as *E. Philadelphicum*, *E. heterophyllum*, *E. annum*, and *E. strigosum*, the latter two species being known as the daisy fleabane. In England two allied genera, *Pulicaria* and *Conyza*, are known as fleabanes. The above-named species of *Erigeron* are all worthless weeds, found in pastures and waste places throughout the United States. They are perennial herbs, with alternate leaves, stems from two to four feet high, the flower with yellow disk, and white or purplish rays, narrow and numerous. The *Compositæ* most deadly to insects are certain species of *Pyrethrum*, of Asia and Europe. The leaves of these are used in the Persian insect powder.

FLETCHER, John (John William de la Flechere) (1729–1785), a clergyman of the Church of England and prominent coadjutor of the Wesleys, was born in Nyon, Switzerland, Sept. 12, 1729. He was educated at the University of Geneva, and, contrary to the wishes of his parents, chose for himself the military profession. At the age of twenty he went to Lisbon and accepted a captain's commission in the army of Portugal, he and his company being assigned to a man-of-war then about to sail for Brazil. But an accident prevented his sailing, and when he procured a commission in the army of Holland his plans for a military career were again thwarted. At the age of twenty-three he went to London for the purpose of perfecting his knowledge of the English language. While there he engaged as tutor in the family of Thomas Hill, a member of Parliament from Shropshire. From Mrs. Hill he first heard of the Methodists, and seeking them out he joined the society. In 1757 he was ordained in the English church at Whitehall, and in 1760 settled at Madeley. Here he applied himself to the work of his ministry with self-consuming zeal, preaching in different parts of the parish, and employing many hours of the night in study and prayer. Failing in health, in 1769 he visited France, Switzerland, and Italy. On his returning to England he was chosen to take the direction of a school established by the countess of Huntingdon at Trevecca in Wales "for the education of pious young men" who desired to enter the Christian ministry. He accepted this position, however, with the understanding that he should be allowed still to serve his parish at Madeley. In 1771 Lady Huntingdon was induced to order that whoever did not fully disavow Wesley's views must quit the college. After some deliberation Mr. Fletcher resigned his office, and published his well-known *Checks to Antinomianism.* In 1778 he again visited Switzerland in pursuit of health, and remained there for nearly three years. On his return he applied himself to the work of his calling with unabated ardor until his death, Aug. 14, 1785.

Fletcher's life was one of uncommon purity and spiritual elevation, though at times bordering on asceticism. He lived in the most simple manner, and gave away all he could spare for the relief of the poor. As a preacher he was the Chrysostom of Methodism. He wrote in an easy, flowing style, though with great clearness and logical acuteness. For vigor of thought, force of argument, and the entire absence of bitterness his controversial writings have been pronounced one of the best models to be found in the literature of polemical theology. Fletcher's *Works* are published in this country in 4 vols. 8vo. His treatise upon human depravity, entitled *An Appeal to Matter-of-Fact and Common Sense*, and also his *Pastoral and Familiar Letters*, are published in separate volumes. (D. W. C. H.)

FLEURY, Émile Félix (1815–1884), a French general, was born in Paris, Dec. 23, 1815. He was educated at the Collége Rollin, and in 1837, after losing his fortune, joined the corps of Spahis, then just formed. He served in eleven campaigns in Algeria, and by his gallantry obtained rapid promotion. He returned to France in 1848 and ardently served the Bonapartist cause. In the *coup d'état* of Dec. 2, 1851, he was wounded in the head. He was made brigadier-general March, 1856, and general of division August, 1863. In 1866 he was sent on a diplomatic mission to Italy, and in September, 1869, was appointed minister to Russia. On the downfall of Napoleon III. in September, 1870, he retired to Switzerland, but still retained his rank in the French army. In October, 1879, he was placed on the retired list. He died Dec. 12, 1884.

FLINT, a city of Michigan, county-seat of Genesee co., is on the Flint River and at the intersection of the Flint and Pere Marquette Railroad with the Chicago and Grand Trunk Railroad, 64 miles N. W. of Detroit. It has a court-house, city-hall, 2 national banks, 2 daily and 6 weekly newspapers, 13 churches, a high school with fine building, 10 graded schools, and 2 public libraries. Its business was formerly altogether in lumber, but it has now a large woollen-mill, cotton-mill, paper-mill, wagon-factory, flour-mills, and grain-elevators, and other industries. It is lighted with electricity and gas, and has water-works. Its streets are well shaded with trees, and it has a park. Its property is assessed at $7,830,720. A trading-post was established here in 1819; the city was incorporated in 1855. Its population in 1880 was 8409.

FLINT, Austin, Sr., an American physician, was born at Petersham, Mass., Oct. 20, 1812. Both his grandfather and father were prominent physicians in that State. Austin was educated at Amherst and at Harvard College, and graduated from the medical department of the latter in 1833. After some practice in Massachusetts he settled at Buffalo in 1836, where he became eminent in his profession. In 1847 he assisted in founding the Buffalo Medical College, in which he was professor of the principles and practice of medicine. He had previously held a professorship in Chicago for a year, and in 1852 he accepted a position in the University of Louisville, but in 1856 returned to the college in Buffalo as professor of pathology and clinical medicine. From 1858 to 1860 he spent the winters in New Orleans as professor of clinical medicine in the medical school, and having also established practice in New York city he was in 1861 appointed a physician of Bellevue hospital and professor in its college. In 1872 he was elected president of the New York Academy of Medicine. He was editor of the *Buffalo Medical Journal* (1846–56), and has published *Physical Exploration of the Chest and Diagnosis of Diseases affecting the Respiratory Organs; Pathology, Diagnosis, and Treatment of Diseases of the Heart; Principles and Practice of Medicine* (1866; 3d ed., 1873); *Causation and Prevention of Disease* (1867); *Essays on Conservative Medicine* (1874); *Phthisis* (1875); *Manual of Percussion and Auscultation* (1876).

FLINT, Austin, Jr., an American physiologist, son of the preceding, was born at Northampton, Mass., March 28, 1836. He spent a year in Harvard College, then began the study of civil engineering, but in 1854 devoted himself to medicine, studying at Buffalo, Louisville, and Philadelphia, and graduating from the Jefferson Medical College in 1857. He then succeeded his father as editor of the *Buffalo Medical Journal*, and in 1858 was made professor of physiology in Buffalo Medical College. In 1859 he took a similar professorship in New York, and again in 1860 one in the New Orleans School of Medicine, but in the outbreak of the civil war resigned and went to Europe. With Charles Robin and Claude Bernard he studied physiology and then returned to assist in organizing the Bellevue Hospital Medical College, New York, in which he has since been professor of physiology. He was surgeon-general of the State of New York (1875–79). His whole career has been marked by original researches of great importance in physiology. In 1863 he published observations on the excretory function of the liver, which received from the French Academy of Sciences a prize of 1500 francs. He showed that one of the functions of the liver is to remove the waste nervous tissue (cholesterine). He has also published *Physiological Effects of Severe and Protracted Muscular Exercise* (1871), founded on observation of Weston the pedestrian; *Manual of Chemical Examination of the Urine* (1872); *Physiology of Man* (5 vols., 1866–72); and a *Text Book of Human Physiology* (1875).

FLORA. The term flora is used to designate the assemblage of plants found in any given region or country, and is the exact parallel of "fauna," which applies to animals. As is the case with animals, assemblages which present notable peculiarities have their limits determined by natural barriers, not by the artificial lines which separate countries, so that, though the plants of any district form its flora, distinctive floras have boundaries of their own. Plants, like animals, have their centres of distribution; while families are peculiar to certain regions, and are most abundant in a still narrower region. To a certain extent the distribution of plants parallels that of animals, yet there are great differences. Climate is a much more effectual barrier to plant life than it is to animals, many of which can bear considerable change of temperature provided they find food. Thus the plants of any region are a better index of its climate than its animals can be. The existence of a sub-tropical flora in British America and in Greenland, during the cretaceous and much of the tertiary ages, proves that a milder climate once reigned in those regions.

In the United States and British America two tolerably distinct floras exist: that of the Atlantic coast, with a preponderance of broad-leaved deciduous trees, and that of the Pacific coast, with a preponderance of cone-bearing trees. In both regions coniferæ form a larger proportion of the flora in the north than in the south, but the species of the two coasts are usually different. A small strip of country around the point of Florida has a tropical flora akin to that of the Antilles.

The most peculiar flora is the companion of the most peculiar fauna, and has its home in Australia. Eucalypti, casuarinas, banksias, and many other strange forms have their home here, but there is a lack of that rich variety which can be found in America, especially in the region of the Amazons, and also in India.

The flora of the ocean is unvaried, and is limited to depths to which light can penetrate. Its forms are algæ, commonly called seaweeds. (W. N. L.)

See Vol. XII. p. 215 Am. ed. (p. 247 Edin. ed.).

FLORICULTURE. In the United States floriculture has developed to a business of great commercial importance, while those who follow it as a labor of love have to pursue it by different methods from those adopted in most parts of the old world. In Europe a large capital is invested in the growth of pot-plants for the adornment of rooms, yards, and small conservatories, and the flower-markets of Paris and other cities of the continent are famous for the interest derived from these products of the florist's art. In America the heat of the summer's sun necessitates the darkening of rooms, while the dry and otherwise close atmosphere from the artificial heat required during long winters is much more unfavorable to the growth of plants in dwellings than on the other side of the Atlantic. The trade in pot-plants is, therefore, comparatively light and is mostly confined to small growers who can invest a few hundred dollars in a greenhouse in most of the larger cities and towns. There is, however, a widespread love for decorating home grounds, parks, and public gardens with flowers that will prove ornamental during the summer season, and an enormous capital is devoted to growing plants for these purposes. The taste for cut flowers is also universal, and the trade in these is now extremely large; and there are few of the larger towns in the United States that have not extensive cut-flower establishments. This has been fostered, in a great degree, by the introduction of steam-heating apparatus, instead of heating by hot water as still common in Europe. Very large areas of glass can thus be rapidly and easily warmed, and the chief expense in maintaining the establishment be reduced to a minimum. Each house is devoted to a single kind of flower, and frequently not more than a dozen kinds of plants are grown in the whole establishment. The skill to manage these few items is thus soon mastered, and the simplest form of labor under one intelligent head is all that is needed for success. Roses, carnations, bouvardias, lilies, heliotrope, richardia or calla lilies, pansies, violets, myrsiphyllum asparagoides, popularly known as smilax, and rare orchidæ are the leading staples in this trade. These are mostly grown in shallow benches of wood or slate, elevated so that the plants are brought as near to the glass as possible. Carnations, bouvardias, and similar plants are renewed every year. Raised from cuttings in spring, they are planted in the open ground during summer, and transferred to the benches before winter sets in. Roses are also grown largely in benches, but these remain two or three years before renewal. The houses for this class of floriculture are built much more cheaply than in Europe. It is found that as much direct sunlight as possible is the most favorable to a flowering condition in winter, hence as little wood as can be used is employed. Ordinary sliding sashes are, therefore, dispensed with, and only enough rafters employed to stiffen the building. The sash-bars and glass cover the whole surface, the system being known as the "fixed roof." Expensive systems of ventilation necessary in Europe are not required here. The pressure of the atmosphere under a very low temperature, as against the warm temperature of the inside of the houses, causes sufficient fresh air to find its way in through little cracks and crannies which everywhere abound. These houses cannot be as readily removed as those with sash, but the ease with which land can be purchased in America makes the removals, risked under European tenure of land, of little consideration. The houses are generally built with the feeling that they will remain till they rot away. The raisers seldom retail their flowers, but sell them to the city florists who put up floral work. This is generally through a commission house in each large city, to which the retail florist goes to get his supplies. Smaller towns get their requirements by telegraph to the growers and commission men, the flowers going by express in boxes especially designed for their preservation. In this way flowers are often sent 500 miles to the dealer. At the present time there are about 8000 florists engaged in raising plants and flowers in the United States, the ground occupied by their glass houses embracing near 700 acres. It is estimated that 24,000,000 rose-buds were grown and cut for market during 1884, and about 125,000,000 carnation flowers. Over 2000 persons were engaged in that year in simply selling flowers, and there were over 700 firms occupied in furnishing glass, wire, baskets, and other wares, known as "florists' supplies."

The trade in bedding plants has increased amazingly since the postal laws have admitted of sending four-pound packages through the mails. Ingenuity has introduced strong boxes of but a few ounces in weight, and by skilful packing the plants can be sent in perfect safety two or three thousand miles, and from one side of the continent to the other. Some houses devote themselves to raising but a single class of plants for mailing purposes. One grower who makes roses a specialty sends in this way millions of plants a year. For bedding purposes the list of flowering plants raised in quantity is not large—Zonale pelargoniums, or, as they are popularly known, geraniums, and roses being the leading kinds. The long and warm American summers are not favorable to continuous bloom in many varieties, a character essential to a good bedding plant. Plants with colored leaves—leaf plants, quite as varied and conspicuous as flowering plants—are found more desirable and are raised in enormous quantities at low figures for this purpose. The prices range from $40 to $120 per 1000, and as many as 50,000 are often used for bedding purposes in large parks and gardens in a single season. Of the leaf plants now used varieties of the coleus and achyranthes, or allied genera, are most popular; but the skill of the florist is so widespread and fashion so changeable that new kinds are continually being introduced and displacing the older ones. Full lists of to-day have therefore little value. These new forms originate either by some unknown natural law of variation in seedling plants, by selection of seedlings that vary in some particular line desired by the florist, or by a branch still under the operation of some unknown law, producing characters wholly unlike the parent, which branch, when cut off and set out to have roots of its own, has the character more or less hereditary. Many of the popular florists' roses have originated in this way. They are called "sports." Varieties raised from seeds are called "seedlings." Variation is aided by crossing between varieties or hybridizing between species. New Zonale pelargoniums are chiefly raised in this way. Some with partially double flowers often have a few perfect stamens with pollen. This pollen placed on the pistil of a single flower will give seed producing many plants with double flowers. A dark flower crossed with a lighter gives progeny of many intermediate stages. New leaf plants are hastened also by the cross-breeding process.

Another branch of commercial floriculture in which a large amount of capital is invested is the raising of flower seeds. The great bulk of seeds sold by American seedsmen is imported from Europe, but a large number of species seed better in an American climate. Near all the large cities are flower farms, in which seeds are either raised by the seedsman for his trade or by parties under contract for him. This industry is growing in interest continually. Numerous kinds now imported could be better raised in America if the demand would equal the sales of the older established European houses.

Floriculture by amateurs is not so widely diffused as in Europe—not owing to a lack of love of flowers, as the general use of cut flowers shows—but chiefly from the uncertain tenure of land, the variations in annual income, and the difficulty in retaining for any length of time intelligent gardening supervision where good gardeners, as well as other classes in the community, have so many opportunities for getting into business or otherwise bettering their condition. But numbers of the wealthier classes grow the flowers they require for ornamenting their own grounds; others have good collections of mixed plants in conservatories and greenhouses and grow the flowers they require for the essential cut-flower department of their households, while a few pride themselves on special collections, such as of ferns, palms, roses or orchideous plants.

(T. M.)

See Vol. IX. p. 296 Am. ed. (p. 338 Edin. ed.)

FLORIDA, the most southern of the United States, lies between the parallels of 24° 30′ and 31° N. lat. and the meridians of 79° 48′ and 87° 38′ W. long. It forms the eastern barrier between the Gulf of Mexico and the Atlantic Ocean; the Florida Straits, south of the peninsula, and separating it from the Bahamas, form the eastern outlet of the Gulf. The State consists of a large peninsula, which from the St. Mary's River to the southernmost keys is 450 miles in length and averages about 95 miles in breadth, and of a long narrow stretch of land extending west from the St. Mary's to the Perdido River, which is interposed between Southern Georgia and Alabama and the Gulf, and has a length from east to west of more than 450 miles and a breadth of from 40 to 100 miles. Its area is 58,680 square miles or 37,555,200 acres; of which 4,440 square miles or 2,841,600 acres is a water surface—bays, gulfs, sounds, lakes, harbors, and rivers, while more than four times that amount is often submerged. The land area, nominally 34,713,600 acres, has really less than 25,000,000 acres of available surface.

State Seal of Florida.

Florida is very level. There is nothing like a mountain in the State, and in the north-west, where there are some hills, there is no elevation much exceeding 200 feet above the sea. In the peninsula, below the mouth of the Suwannee and St. Augustine on the east, the coast survey has been able to find but one elevation attaining to the height of 60 feet. Lake Okeechobee is from 16 to 22 feet above the sea, while most of the four southern counties range from nothing to 12 feet above the sea. The Everglades form the expanded outlet of Lake Okeechobee, and in the rainy season are submerged, except the numerous islets with which they are studded. Florida has a coast-line of about 1200 miles, with numerous fine bays, harbors, and estuaries. The harbors on the Atlantic coast are Fernandina, St. Augustine, Daytona, and Port Orange, and Jacksonville on the St. John's River; on the S. Key West; and on the Gulf coast, Oyster Bay, Punta Rassa, Caloosahatchie River, Charlotte Bay, Tampa Bay, Cedar Keys, Deadman's Bay, St. Marks, Appalachee Bay, Appalachicola, Pensacola, Escambia, Perdido, etc. The principal rivers are, on the Atlantic side, the St. Mary's and the St. John's, with its large tributary the Ocklawaha, and the Kissimmee, which flows into Lake Okeechobee; on the Gulf side the Perdido, Escambia, Appalachicola, St. Mark's, Suwannee, Withlacoochee, Peace Creek, and Caloosahatchie, with their affluents. The so-called Indian River is not a river, but a long narrow sound with several inlets extending along the Atlantic coast for almost 100 miles, and separated from the ocean by sand-bars. Of the rivers, the St. John's is navigable to Sanford, and for large steamers to Palatka. The St. Mary's, the Appalachicola, Perdido, Escambia, Suwannee, Ocklawaha, Kissimmee, Caloosahatchie, and several other streams are navigable, the first six for large steamers.

Lakes are found everywhere. Lake Okeechobee, the largest, has an area of 650 square miles, and in a rainy season seems to extend over the entire Everglades, an area of 6400 square miles more. The other large lakes are Ahapopka, Istokpoga, Orange, Kissimmee, Cypress, Lake George, Lamona, Washington, Tohopokaliga, Alligator, Dunn's, Harris, Trati-apopka, Griffin, Jessup, Monroe, Santa Fe, Maitland, etc.

The islands are literally innumerable. The Everglades contain thousands; south of the peninsula, but belonging to it, and included in Monroe county, are the Florida Keys or *Cayes*, coral islands and islets, of which the group known as the Dry Tortugas (Turtle Islands) form the western termination. They extend 220 miles; many of the thousand or more are not inhabited, but some of them are of considerable size. Key Largo is the longest, and Key West contains an important city and naval station. On the south-west is a group called the Thousand Islands, and all along the Gulf coast, as well as the Atlantic coast of the peninsula, are numberless keys, coral islands, and sand banks, many of them inhabited by fishermen and others.

Geology.—The geology of Florida has until within a few years past been very generally misunderstood. The explorations of the United States Coast Survey since 1879 have thrown much light upon it. It is now conceded that the whole peninsula has for its base coral-reefs sufficiently close together to form a good and sufficient foundation, and that these extended, in the remote æons, to what was then the shore-line of the mainland, now the line of the Gulf coast of North-west and North Florida. By depressions and subsequent upheavals, what are now the Central Counties of the State received a deposit of greater or less thickness of the Vicksburg limestone of the Upper Eocene period. The peninsula was at this age more than twice its present breadth, but not much more than half its present length, from north to south; this increase of breadth being on the west or Gulf side. The lower part of the peninsula was still submerged, the coral reefs not having yet reached the surface. The broad plain of Central Florida was further elevated during the Miocene and Pliocene periods, and was subjected in common with the northern and north-western portions of the State, of which it then formed a part, to sub-aerial erosion, some of the rivers of North-western Florida probably making their way through the uplifted plains to a more southern outlet. The distribution of high and coast or gulf hammocks on the western half of the peninsula was probably caused by this erosion. During the period of the deposit of the beds of the Champlain strata (stratified drift or orange sand) there was another submergence, in which Central and Northern Florida, as well as the southern portions of what are now Alabama and Georgia, received deposits of pebbles, sand, and clay, varying in thickness from a few feet to two hundred feet. These beds were sediments from rapidly flowing, ever varying currents. In the northern and north-western parts of the State beds of red and yellow loam unstratified and without fossils are deposited directly upon this stratified drift. The axis of elevation was from north-east to south-west, coinciding probably very nearly with a line drawn from the mouth of the St. John's River to Bayport on the Gulf coast. During all this long Tertiary period Southern Florida had no existence above the waters. But in the Quaternary period there was again a partial elevation which brought the peninsula to nearly its present form. The southern portion of the peninsula and the keys and reefs which surround it now reached the surface and received a coating of the peculiar white sand which still characterizes them, probably from the waters of the Gulf, which still often washed over them, and from the floods and slow-moving streams, and the decaying vegetation, some acquired a deposit of loam and humus, which made them fertile. The streams of Central and Northern Florida began to flow in better defined channels, and some of them had sufficient descent in their course to furnish a moderate water-power. It will be seen from this brief history that Florida has no geological strata of earlier date than the Vicksburg limestone (Upper Eocene) of the Tertiary period. Aside from this limestone, of which there are seven varieties, there are no other Tertiary rocks except a Miocene limestone, not fossiliferous, on the eastern slope of the peninsula. The deposits of the Champlain era were, as has already been stated, stratified drift and a non-stratified loam. All the other deposits are of a later date and belong to the Quaternary or recent period. The Vicksburg limestone is cavernous, and where the cavernous strata are thin they frequently break through, forming those sinks which are common to this State and Alabama. The waters gathered in these caverns may pass by underground channels to the larger streams or to the sea; sometimes they reappear at the surface, after a subterraneous course of considerable length, as "boiling" or "blue springs," and flow thence by a short open run to the nearest large water-course to the sea.

In a State so recent geologically there are no minerals of importance. There is a bed of lignite or brown coal of the Tertiary period on the Suwannee River, but it is of poor quality, and though worked for a short time it is now abandoned. There are beds of marl at the head of Tampa Bay, and near the mouth of Manatee River, and phosphate rock, though of uncertain extent and commercial value, has been discovered in Clay, Alachua, Wakulla, Duval, and Gadsden counties, and a species of limestone called coquina stone, and much used for building in St. Augustine. The Vicksburg limestone, which is not so good for building, occurs in ten or twelve counties.

Most of the springs which abound in the State owe whatever medicinal value they have to the purity and sparkling character of their waters. A few, however, like the Newport Springs in Wakulla county, the Hampton Springs in Taylor, the White Sulphur Springs in Hamilton, the Suwannee Springs in Suwannee, the Green Cove Springs in Clay, and the Tarpon Springs in Hillsborough county, contain more or less sulphur, iron, and other substances.

Soil.—Florida has a great variety of soils, adapted to different classes of products. The best general classification is, perhaps, that of (1) the oak, hickory, and pine uplands; (2) that of the long-leaf pine lands; and (3) that of the pitch-pine, treeless, and alluvial lands; but each of these has many sub-divisions. I. The oak, hickory, and pine uplands have three distinct subdivisions: the red-loam lands, which are found only in Jackson county, with an area of 150 square miles; the brown-loam uplands, with oak, hickory, and short-leaf pine, occupying 1190 square miles; and the long-leaf pine ridge-lands, occupying 960 square miles. These are all in North-western Florida, on both sides of the Appalachicola River. The soil is fairly good; the forest trees which grow upon it are strong and vigorous, and the land where cultivated bears moderate, though very seldom large, crops of Indian corn, and in some places the small grains; vegetable and root crops yield moderately. In most of this region the orange grows well, but is liable to be injured by frosts. The pine, both the long and the short leaf, attain large proportions here, and so do most of the hard woods. Most of the subsoils are clay, though sand increases in the subsoils as we go southward.

II. Of the long-leaf pine lands proper there are three distinct varieties: the rolling lands, the flat pine lands, and the hammock lands. The rolling pine lands have generally sufficient elevation to secure good drainage, usually from fifty to sixty feet above the sea. They are the best orange lands in the State, but in general are not well adapted to the culture of grain or root crops. The soil is often a dark-colored, sandy loam, usually underlaid with a stiff, clayey loam; but at many points, with the same forest growths, the surface soil is a white, brilliant sand which, though it appears to be utterly destitute of humus, yet sustains heavy growths of long-leaf pine, Spanish and red oaks and hickory, and proves well adapted to orange-culture, though soon needing a large addition of wood-ashes and other fertilizers. These rolling pine lands are found in 24 counties, mostly of Northern and Central Florida, though of different degrees of fertility. They have an area of about 15,120 square miles. The flat pine lands form the margin of the rolling lands as the Atlantic and Gulf coasts are approached. They are badly drained, from their flatness, and become water-soaked and marshy in wet weather, and numerous lakes are found on them at all times. The soil is sandy, and is usually underlaid by a solid, clayey subsoil or one of densely-packed sand, either of which holds water, and prevents drainage, and swamps result. These lands cannot be profitably cultivated. Their principal forest growths are long-leaf pine, blackjack oak, saw-palmetto, and gallberry. They are found in 22 counties of Central and North-western Florida and have an area of about 11,250 square miles. There are also similar tracts of flat, marshy lands, but of higher elevation, in the seven North-eastern counties of the

State, where they comprise an area of about 2280 square miles.

Hammock lands are either high hammocks, low hammocks, or Gulf hammocks.[1] Some of the high hammocks are very fertile, and have large forest-trees growing upon them; others, less productive, contain more sand, but are still fertilized by the crumbling limestone beneath. The Gulf hammocks are of greater size, and though apparently composed of a white or grayish-white sand, derive a certain fertility from the underlying limestone. They are adapted to orange-culture, but after a little time require additional fertilization. The hammocks are usually partially or entirely surrounded by water or marshes. The high hammocks support a vigorous growth of live-oaks and other oaks, hickory, magnolia, bay-laurel, sweet bay, long-leaf pine, cabbage-palmetto, cedar, elm, and red linden. The color of the soil varies from brownish-red to nearly black; it is always more or less sandy, and is from 8 to 12 inches thick. The subsoil is usually a marl or limestone, and the disintegrated Vicksburg limestone invariably underlies it. The low hammocks are found on the margins of many of the lakes and streams of Central Florida, and in some of the low, swampy areas, not connected with any lake or running water. The finest trees are usually those characteristic of a swampy region, the cypress and palmettoes predominating. The soil is white or grayish, but with a subsoil largely impregnated with lime from the underlying limestone. The low hammocks are good orange-lands, though less fertile than the high hammocks, but are not adapted to the culture of cereals, vegetables or root crops. Along the Gulf coast from Wakulla county to Hillsborough there are extensive patches of hammock land, known as Gulf hammocks, in which the white or very light-gray surface soil predominates, and the underlying limestone imparts fertility to it.

III. The pitch-pine, treeless, and alluvial lands of Florida include flat woods (pitch-pine), swamps, prairies, and savannas, everglades and marshes. The pitch-pine (a valuable timber) grows all along the Gulf coast. The coast marshes and swamps are not confined to the southern portion of the peninsula; the treeless portions are practically mere modifications of these marshes, brought about by varying degrees of moisture, and changes from salt to fresh water. This division of soils and vegetation embraces an area of about 23,290 square miles, of which 4850 square miles are swamp-lands; 5840 square miles, coast marshes and flat lands, timbered with pitch-pine; and 12,600 square miles, prairies, savannas, and everglades. The area of the Everglades is estimated to be 6400 square miles. The pitch-pine not only replaces the long-leaf pine on the entire Gulf coast, and is equally frequent with it on the Atlantic coast, but below the latitude of 27° is the only species of pine throughout the peninsula. The prairies and savannas alternate with the flat woods in Manatee and Brevard counties, while the Everglades, which occupy most of Monroe and Dade counties, extend into Manatee also. Very little of this region is adapted to agriculture, but is used almost exclusively for grazing. To sum up then as to soils, the swamp-lands of Southern Florida are the most productive, and the most durable in their fertility, but are best adapted to tropical crops—sugar-cane, coffee, rice, anona or custard apple, pine-apples, guavas, bananas, and liquorice. The swamp-lands, farther north, are wet and not easily drained. The low hammocks and Gulf hammocks come next, and the high hammocks third. After these come the pine, oak, and hickory lands, and the pine barrens last. Muck, marl, humus, and phosphatic rock are accessible in many sections, and with the aid of these even the poorest lands may be made to produce good crops of the sorts which are adapted to culture in their several localities.

Vegetation.—Florida has a large proportion of forest. There are, at the present time, probably 25,000,000 acres of land, more or less densely covered with timber, and in this the yellow or pitch-pine largely predominates, occupying from three-fifths to three-fourths of the whole. The long-leaf pine comes next, though very much less in quantity. In the lower lands near rivers, lakes, and swamps, the live-oak and other species of oak, hickory, ash, beech, cedar, magnolia, bay-laurel, sweet-bay, gum, cypress, and, in Southern Florida, the saw-palmetto, cabbage-palm, date-palm, royal palm, mahogany, lignum-vitæ, green ebony, mangrove, the cork-tree, poplar, palm-tree, olive, cotton-tree, juniper, and red cedar; and many rare shrubs which do not thrive in a more northern climate. There are said to be nearly 200 species of arborescent plants in Florida, about one-half of all in the United States. In Northern and North-western Florida the sylvan growth is substantially that of the Middle States and the Mississippi Valley, the black-walnut, bass-wood, beech, birch, sugar-maple, cotton-wood, sycamore, elm, ash, and red maple predominating. Of cultivated fruit-trees, those belonging to the genus *Citrus* largely outnumber all others, the species *Citrus aurantium* (orange) having at least twenty sub-species or distinct varieties, while the shaddock of six varieties, bitter orange, lemon, lime, citron, and pomegranate are also found in the wild state.

The culture of the orange is one of the largest industries in the State; the crop was reported as being 140,000,000 oranges in 1883, 166,000,000 in 1884, and over 200,000,000 in 1885, while every year many thousands of new trees come into bearing, and those already in bearing yield larger crops. The Florida oranges have a higher reputation for excellence than any other oranges in the market, but there is great difference in these—a difference depending upon soil, temperature, and methods of cultivation. Figs, olives, English walnuts, Italian chestnuts, and, among the shrubs, the pine-apple, anona or custard apple, banana, and guava are cultivated in the central and southern counties. In the northern and north-western counties the apple, quince, and pear are favorite fruits, and the early summer and autumn varieties are much liked; the peach is cultivated for exportation, but is not of prime quality.

Animals.—The black or brown bear of the Southern States (and possibly the Mexican bear) are somewhat numerous; wolves are more rare, but the gray and possibly the black wolf exists there. There are red and gray foxes, cougars or panthers, and 2 or 3 of the smaller felines, opossums, raccoons, ground-hogs, the fisher or land otter, several species of rats, mice, and bats. Of game animals there is the white or cottontail deer, and probably the Virginia deer also, and rabbits, squirrels, etc., in great numbers. Among reptiles the alligator has been more numerous in Florida than anywhere else in the United States, frequenting the St. John's, Suwannee, Apalachicola, Caloosahatchie, and other rivers, and the larger lakes; but the persistent hunting of them, both for sport and for their hides, which have now a high commercial value, have greatly diminished their numbers. There is a true crocodile in South Florida, and the manatee or sea-cow is still found in the sounds and bays. The food-fishes of Florida have attracted great attention of late years. There had been for many years a considerable demand for fresh and salted mullet from Cuba, and even while Florida was a Spanish colony there were several mullet-fisheries on the west coast of Florida for the Cuban trade. This has greatly increased of late years, and there are fishing-stations on both the Atlantic and Gulf coasts, and about 5,000,000 pounds of mullet alone are exported, valued at $125,000; but the mullet-fishery is now only an item of the Florida fish production; the grouper, a favorite fish in the West Indies, abounds on the Gulf coast, and is taken with hook and line. The value of the export in some years has reached $141,000. The sea-trout, the Spanish mackerel, tarpum, and blue-fish, which are caught on both shores in large numbers, are in good demand at the North, and their capture employs many hands; but the finest food-fishes of the Florida coast are the pompano or pumpkin-fish, and the red snapper. The last named is now one of the most popular fish in the New York market. The export from West Florida in 1884 was over 3,500,000 pounds, and is constantly increasing. The beauty of the fish and its fine quality as a food-fish will give it a permanent place in the Northern markets. The pompano is not so well known, and does not bear transportation quite so well, but its consumption is increasing. Shad are exported early in the season, being found plentifully in all the larger rivers. The numerous keys and coral islets are the home of the sea-turtles, and the green turtle, so highly prized by epicures, is largely exported from Key West. The shark, the octopus, and other large species of cuttle-fish are common on the South Florida coasts.

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[1] The term "hammock," sometimes though improperly written "hummock," is peculiar to Florida, or at least to the Southern Gulf States. It signifies, there, an elevation of the surface, usually of no great extent, somewhat analogous to the "knoll" of the Northern States, but which is composed of humus, sand, and disintegrated limestone (the Vicksburg limestone).

There is a greater variety of birds in Florida than in any other State in the Union. Of the birds of prey, the king vulture, next in size to the condor, has been found only here and in Mexico, on the North American continent. There are many lesser vultures, and eagles, hawks, kites, and owls. Among the waders the scarlet ibis and the flamingo are the most noticeable, though there are herons, cranes, and other waders, and many species of ducks, teal, brant, etc., among the swimmers; the wild-turkey is the finest of game-birds, but there are also grouse, snipe, woodcock, rail, reed-birds, etc., in great numbers. The smaller birds are remarkable for the beauty of their plumage, and some of them, like the mocking-bird, for the melody and variety of their song. The insect pests, sand-flies, mosquitoes, black-flies, and chigoes, are plentiful enough, at certain seasons, in the swampy and marshy regions, but elsewhere in the State they are not abundant, and in some districts are unknown.

The domestic animals in the State in January, 1884, were, according to the report of the Agricultural Bureau, 27,202 horses and 11,221 mules, valued at $3,515,052; milch cows, 46,054, valued at $658,572; oxen and other cattle, 560,000, valued at $5,140,800; sheep, 98,940, valued at $173,145; swine, 313,600, valued at $671,104. It should be remarked that the cattle of Florida have hitherto been of very small size, and of lower average value than those of any other State in the Union; but that recently increasing attention has been paid to breeding from the best stocks, with very hopeful results. The sheep and swine have not been of particularly good breeds, and hence have not done the State much credit.

Agricultural Products.—In 1884 Florida produced 3,837,000 bushels of corn, valued at $3,069,600; no wheat was reported, either in 1883 or 1884, and none is believed to have been produced; 494,000 bushels of oats were reported, valued at $296,400; potatoes, about 160,000 bushels, of which more than five-sixths were sweet potatoes. This does not, however, represent fairly the sweet potato crop, which in 1880 was 1,687,613 bushels. They were valued at $150,000. The rice crop averages about 1,200,000 pounds, sugar not far from 1500 hogsheads, and molasses over a million gallons. The hay crop was insignificant; of cotton, the crop was estimated at 60,000 bales, but a considerable portion of this was Sea-island, and its estimated value exceeded $3,000,000. The orange crop in 1884 reached 166,000,000, but even this was exceeded in 1885, both in quantity and quality, the product exceeding 200,000,000. This increased production, however, caused a reduction of the price, which fell to an average of $1.50 per hundred at the groves, so that the entire crop realized only $1,500,000. The other tropical or semi-tropical crops of Florida—lemons, limes, shaddocks, anonas, bananas, guavas, and pine-apples—are not yet brought into market in such quantities as to justify any estimates of their amount or value.

From the north-eastern counties large quantities of market garden vegetables, tomatoes, sweet potatoes, and small fruits, are sent to Northern markets. These are mostly shipped through the ports of Fernandina, Jacksonville, St. Augustine, and Brunswick, Ga.

Climate.—The range of temperature and the amount of rainfall in a year are important factors in their relation to the desirableness of a climate, yet there are others quite as important in deciding its healthfulness and adaptation to settlement. So far as temperature is concerned the range of the year throughout the State is not excessive. In Northern Florida the usual range is from 90° or 93° to 26°, or about 67°; in Central Florida, from 95° to 43°, or 52° (rarely there is a single day or night of frost); in Southern Florida there is seldom an approach to frost, and the annual range is from 96° to 46°, or 48°, or 48° to 50°. The annual mean temperature of the State is about 70°.05; for stations north of lat. 28° it is 69°.82, and, more in detail, for spring, 70°.66; for summer, 80°.10; for autumn, 70°.23; and for winter, 58°.29. For stations south of lat. 28° the annual mean is 74°.87; for spring, 74°.94; for summer, 81° 93; for autumn, 76°.27; for winter, 63°.69. Yet in this southern half there is a material difference; the western or Gulf coast maintaining a higher mean temperature than Key West; thus Punta Rassa, lat. 27°, has five or in most years six months from May to October, inclusive, in which the mean temperature ranges from 80°.10 to 83°.10, and the maximum temperature of nearly every day of those months is 90° or more; while at Key West, lat. 24° 36′, but nearly 60 miles from the mainland, the mean temperature in the same months ranges from 78°.11 to 83°, and the maximum temperature of the same months does not average more than 85°. The continuous high heat of Southern or South-western Florida during six months of the year is an objectionable feature. The rainfall exhibits greater variations, though everywhere it is amply sufficient. On the Atlantic coasts it ranges from 47.86 inches at St. Augustine to 53.95 inches at Jacksonville; at Key West it varies from 42 to 50 inches; at Punta Rassa from 32 to 40 inches; at St. Marks, on Appalachee Bay, North-west Florida, from 73 to 77 inches.

As a winter resort for invalids, who require a mild and uniform climate during the cold months, especially to persons suffering from pulmonary diseases, almost all sections of Florida offer remarkably strong attractions; for rheumatic, bilious, and febrile affections it is not so well adapted, and for kidney diseases it is especially undesirable.

From the first of April to the middle of October all of Florida south of 28° 30′, and we might, perhaps, safely say south of 29°, is objectionable, as a permanent residence, to persons from the North who have any tendencies to malarial or typhoid fevers. This might be expected from its geological structure, since its soil is alluvial, with a large admixture of decayed vegetation, and swamps and marshes abound at all points. The refreshing and health-giving breezes, which sweep across the peninsula, modify this condition somewhat, but it exists nevertheless, and is more strongly marked as the season progresses, and on the marshy savannas of South Florida it is perilous to Northern constitutions. North of 29° these diseases are less prevalent, but they exist to some extent even in North-western Florida. Those who are thoroughly acclimated may withstand these diseases even in South Florida, but careful and extended observation indicates that the period of acclimation is a very long one.

Aside from agriculture and the cultivation of the orange, lemon, and other semi-tropical fruits, and the market-garden products of Northern Florida, the industries of the State, though now increasing, have not attained very great magnitude. There is a rapidly growing demand for the yellow pitch-pine, known to the market as Georgia pine, which abounds in Florida; and Western and North-western Florida have many large saw-mills for the production of this valuable lumber and timber. Live-oak is prepared for the shipbuilders in North-eastern as well as in South Florida, and the other oaks and hard woods are in demand for the railroad construction in progress there. The demand for houses and other buildings also causes considerable activity in lumber manufacture. The production of naval stores, turpentine, tar, rosin, and pitch, and the distilling of the turpentine, employ many hands; the manufacture of orange boxes has risen to be an important industry; the production of Havana cigars, now extensively conducted at Key West, and to some extent at other points in Florida, the evaporation of sea-salt, and cotton-seed-oil production, are the other principal manufactures. The *fisheries* are of growing importance. The capture of green and other turtles for the supply of Northern and foreign markets, the sponge- and coral-fisheries, and the rapidly growing trade in food-fishes, the mullet, grouper, sea-trout, blue-fish, Spanish mackerel, pompano, and red snapper, will soon give Florida the pre-eminence over the other Southern States in her fisheries. In 1880 the statistics of these industries, including the fisheries, was 426 establishments, $3,210,680 capital invested, 7984 persons employed, $5,546,448 annual value of products. It has doubled since then.

Railways.—In no Southern State has there been so proportionally rapid a development of railways as in Florida since 1880. At that time there were 554 miles operated. At the close of 1884 there were more than 2600 miles in operation, and though 1885 was not a favorable year for railroad-building, enough has been accomplished to make it certain that there are not less than 3000 miles operated. The great lines of the State are: the Florida Railway and Navigation Company, a consolidation effected in 1882 of the roads of the Yulee system with several other roads, and which now owns or controls more than 700 miles of railway, wholly within the State, and extending to Pensacola on the west and to Plant City on the south. 2. The Plant system of roads, partly in Georgia and partly in Florida. This system extends westward through Southern Georgia and North-western Florida, and southward through Waycross, Ga., and Jacksonville, Fla., to Gainesville, to Sanford, to Bartow, and to Tampa, with several branches. Its mileage in Florida exceeds 1100. There are also twelve or thirteen local railroads not connected with either of these "systems," aggregating about 800 miles. Some of these will doubtless eventually be absorbed. One other great railway project, The International Railroad and Steamship Company's Railway, to extend from the Georgia line and Jacksonville to Turtle Harbor at the southern extremity of the peninsula, with a branch to Tampa, is making progress, but is embarrassed by difficulties both of finance and construction. Its entire length is to be about 600 miles, and about one-tenth of this is now completed.

Canals.—A ship-canal across the peninsula, though long agitated and repeatedly chartered, has not yet been commenced. Another, known as the Barge Line, crossing through the St. Mary's River, Okeefinokee Swamp, and the Suwannee River, and by inland waterways to New Orleans, has also been projected but not built. There are several other canals along the Atlantic coast, and connecting with the slack-water and lake navigation in Southern Florida, which have an aggregate length of about 170 miles.

Four steamship lines leaving New York and having Havana and New Orleans as their ultimate destination stop at Fernandina both in going and returning; these are the Mallery, the Morgan, the Alexandre, and the Ward lines. Others running to Savannah as their port of destination connect with Florida by the railway lines noticed.

Land Companies.—No State in the Union has so large a portion of its area held by land companies as Florida; yet its prosperity within the past five years has been largely due to this very fact. In January, 1881, and for several years previous, from the lands owned by the State, patented to it by the National Government as swamp and overflowed lands, school and university lands, etc., etc., amounting originally to 14,442,464 acres, 1,684,725 acres had been sold, leaving unsold 12,757,739 acres. But under an act of the Florida Legislature, passed in 1855, the trustees of the Internal Improvement Fund were authorized to indorse the bonds of certain railroads to the extent in all of $20,000 per mile, these bonds being a first mortgage or lien to the State on the entire roads, and in case of the failure of the roads to pay the interest on the bonds, the State could sell the roads, but must pay the interest, unless their sale brought a sufficient sum to pay both principal and interest on the bonds. Under this act of Jan. 1, 1881, there had accumulated against this internal improvement fund, which held the public lands as security, arrearages of interest amounting to about $600,000, and with other indebtedness of the State to very nearly $1,000,000. This indebtedness was, by legal proceedings, in what was known as the Vose judgment, declared a first lien on all these State lands, and hence the State's finances were crippled and no aid could be extended to the new railroads and other measures of internal improvement needed for the development of the State. With a fine climate, and most of the elements needed for a rapid growth, the State seemed to be struck with paralysis. On June 1, 1881, relief came in the purchase by Hamilton Disston, of Philadelphia, and his associates, of 4,000,000 acres of these lands, to be selected by the purchasers from the more than 12,000,000 acres which the State possessed, for the sum of $1,000,000 in cash. The State, during the next year, sold also 296,574 acres to actual settlers or to companies in comparatively small holdings. With the money derived from these sales the State was able to liquidate its indebtedness, and has sold and granted about a million acres a year of its lands since 1882.

The first of these great land companies then was the *Florida Land and Improvement Company*, organized by Hamilton Disston and his associates for the disposal of the 4,000,000 acres which they had purchased. Very soon after the consummation of this purchase the Florida Land and Improvement Company sold 2,000,000 acres, or one-half of the whole, to Sir Edward Reed and his associates, English and Scotch capitalists, who organized under the name of the *Florida Land and Mortgage Company, Limited.* This company subsequently purchased other lands in various sections of the State to the extent of over 300,000 acres; their corporate name and directorship has been changed two or three times, and it is not now certain how much land they hold in the State. But Mr. Disston and his associates were disposed to invest still further in Florida lands, and they did so in a new way. They proposed to the trustees of the internal improvement fund of the State to undertake the draining of a portion of the Everglades, the lowering of Lakes Okeechobee, Kissimmee, and other smaller lakes of that region by means of navigable canals and ditches, at their own expense, on condition that one-half (the odd-numbered sections) of the lands so reclaimed should be patented to them. The trustees agreed to the proposition in the autumn of 1881, and active operations were begun at once. The new company was called The Atlantic and Gulf Coast Canal and Okeechobee Land Company. The undertaking was encompassed with many difficulties. Lake Okeechobee was in its best condition only 22 feet above the ocean, and it must be lowered permanently at least 6 or 8 feet before any considerable amount of land could be reclaimed. In October, 1884, the company claimed to have drained permanently about 2,500,000 acres and were to receive patents of 1,250,000 acres. The land is very rich and will yield fine crops of tropical products if it can be permanently freed from overflow; but whether this can be done cannot yet be definitely decided. The Disston companies have also acquired large landed interests on the Gulf coast of the State, some of which they have sold again to other companies, six or seven of which hold from 10,000 to 200,000 acres each in Southern and Central Florida. Recently they have also taken an interest in another great enterprise, which must depend largely for its success on the sale of these reclaimed lands—*The International Railroad and Steamship Company.*

Other land companies are the *Florida Railway and Navigation Company*, which holds at present and in prospect nearly 2,000,000 acres; the *Plant Investment Company*, which holds for itself and the South Florida and Florida Southern Railways, at present and in prospect, almost 3,000,000 acres, a part of its lands being in Southern Florida; the Sumter Land Company, an English company, holding about 50,000 acres, mostly in Sumter county. There are also several smaller holdings of an independent character in Marion, Volusia, and Orange counties; of these the most noted and popular are the De Land purchases in and around De Land, Volusia county, on which a young city has been built up, the Silver Springs Lake Company, at Silver Springs, in Marion county, the Lake Weir Settlement in the same county, and the Orlando Land Company in Orange county.

Education.—The public-school system of the State is increasing in efficiency. The school fund has a capital of $248,900, and yielded in 1884 a revenue of $19,912, to which was to be added $36,691.82 from the one mill annual tax for common schools, making the sum of $56,603.82, to which the several counties were required to add at least an equal sum by a special school-tax. The number of children entitled to public-school privileges was, by the enumeration of 1884, 66,798. In 1880 there were 1135 public schools with 1151 teachers, and an average attendance of 31,477 pupils. In 1884 there were 1504 schools with 58,311 pupils enrolled, and in 1885, 1724 schools with 62,327 pupils enrolled and 45,850 in attendance. The expenditure for public schools in 1885 was $335,000. There is a State University at Tallahassee, organized in 1884, with good prospects of success; two collegiate schools, the East and West Florida Seminaries at Tallahassee and Gainesville, the latter with a normal department; an excellent classical academy at De Land, and a State Agricultural College at Lake City. There are also two institutes for the education of colored teachers and preachers—the Florida Institute at Live Oak, and the Cookman Institute at Jacksonville.

Religion.—There are in the State at least 55,000 members of the different Protestant denominations, implying at least 262,500 of adherent population, and adding the Catholic population there are 273,500 of the population belonging to some religious organization. Of these denominations the Baptists are in the lead, having, in 1883, 398 churches, 221 ordained preachers, 28,731 members. The different branches of the Methodist Church, of which four are represented in the State, had, in 1883–4, a membership, including probationers, of about 19,000. The Protestant Episcopal Church had 27 parishes, 27 clergymen, 1989 communicants. The Presbyterian Church South had 31 ministers, 36 churches, and about 1800 communicants. There are about 20 churches of other Protestant denominations, with a membership of about 3000. The Catholic population is estimated at 11,000.

Population.—The population of Florida in 1870 was 187,748, an increase of 33.7 per cent. from 1860; in 1880 it was 269,493, an increase of 43.6 per cent. from 1870; of these 142,605 were whites and 126,888 colored, including 18 Chinese and 180 Indians. The predominance of the native over the foreign population was about 25 to 1. The voting population in 1880 was 1 in a little over 4 of the inhabitants. Since 1880, owing to the efforts of the land companies to advertise their lands, the conviction of the desirableness of the State as a winter resort, the multiplication of railways and steamship lines, and the great increase of the orange-culture, the population has rapidly increased, and in the opinion of careful statisticians in the State exceeded 325,000 in 1885. The State is divided into 39 counties. In 1884 the total assessed valuation of its property was $55,249,311.

Principal Towns.—Jacksonville is now the largest city in the State, its population in 1885 being estimated at 21,000; Key West, the most southern city in the State, is largely engaged in commerce, the fisheries, and manufactures; its population in 1885 exceeded 12,000. Pensacola, a United States naval station, had 6845 inhabitants in 1880, and was said to have 8000 in 1885; Fernandina, a growing seaport, has about 4500; Tallahassee, the capital, is not growing rapidly. It had 2494 inhabitants in 1880 and may have 2800 now; St. Augustine, the oldest town in the United States, has over 3500 inhabitants. Other important and growing towns are Palatka, Tampa, Lake Butler, Lake City, Appalachicola, Maitland, De Land, Enterprise, Sanford, Gainesville, Vernon, Ocala, Live Oak, Welaka, etc.

The history of Florida since 1879 has been one of rapid growth and development in all directions, but not of stirring incident in either its political or civil affairs. At that time George F. Drew was its governor, and the State was hampered with a debt, partly a heritage from former administrations, which seriously crippled this small State and prevented its growth. Its railroads were incomplete, and some of them bankrupt, its lands were locked up under the Vose judgment, and its taxes were insufficient to meet its current expenses and interest. The inauguration of Gov. William D. Bloxham in January, 1881, proved the epoch of a new and improved condition. The finances of the State were placed on a better basis by the sale of a portion of its lands to Hamilton Disston and his associates, and the subsequent sales to other parties; the railroads were reorganized, and, being enabled to obtain a portion of their land grants, pushed forward their lines to all parts of the State; new towns and cities were built almost by magic to accommodate the winter visitors. Orange-culture began to assume large proportions, capital flowed in rapidly, the fisheries of both the Gulf and the Atlantic coasts were rapidly developed and found new markets in Northern cities; education, which had hitherto been neglected, became an object of great interest. The State University, which had hitherto existed only on paper, was organized and equipped; academies and seminaries were established, and the public schools became objects of solicitude to the citizens. This advance all along the line was coincident with Governor Bloxham's administration, though not, probably, wholly the result of it. He was succeeded in 1885 by Governor E. A. Perry, whose term ends in 1889. (L. P. B.)

FLOTOW, Friedrich von, Baron (1812–1883), a German composer, was born at Teutendorf, in Mecklenburg-Schwerin, April 26, 1812. His parents intended him for a diplomatic career, but at the age of sixteen he went to Paris to devote himself to music. Having studied under Reicha he composed some pieces for private presentation, and in 1839 published the opera *Le Naufrage de la Méduse*, in which he had the co-operation of Pilati. A series of operas quickly followed, among which *Stradella* (1844) and *Martha* (1847) obtained the greatest favor. These are the most characteristic of his works, being marked by fresh and pleasing melodies and brilliant instrumentation. Among his later works were *Die Grossfürstin*, *Rübezahl*, *Indra*, and *Albin*. In 1855 Flotow was made director of the theatre at Schwerin, but resigned the post in 1863. In 1864 he was made a corresponding member of the French Institute. He died at Darmstadt, Jan. 24, 1883.

FLOUR, Manufacture of. This article is entirely devoted to the recent improvements and inventions in flour-milling. As practised in the best American mills, the manufacture of flour consists in a gradual reduction of the wheat as here fully shown.

See Vol. IX. p. 306 Am. ed. (p. 343 Edin. ed.).

The Separator.—Thorough cleaning of the wheat is now universally recognized as the first great step in modern milling processes. By proper use of the fanning-mill the farmer may send his wheat to market in a reasonably clean condition, but farmers are not all careful in this matter; hence the inspection rules of all grain markets provide for whatever degree of dockage for dirt the inspector may determine as proper, after getting fair samples of the grain. The Separator here presented is a standard type of the efficient modern machine.

This is termed a Wheat Separator and Oat and Weed Extractor, and consists of a series of rotating sieves, or screens, mounted in a suitable frame, with a fan attachment, as shown in engraving (Fig. 1). Wheat is fed into the machine from bins, cars, or the farmer's wagon at a point above the upper sieve, being subjected at the same time to a strong air-current, which draws out dust, chaff, light oats, and other foreign matter of a lighter character than the wheat. The latter passes through the first sieve, the perforations of which permit this, while the foreign material tails over this sieve and is carried away. The operations of a second and third sieve are similar to the first. At the bottom of the machine is a fourth sieve, but with perforations so small that the wheat is carried over it, while small seeds and bits of clay, etc., which may have passed the other sieves, fall through it. At this stage the wheat is subjected to another air-draft, for the purpose of drawing out any light impurities that may have escaped the first air separation.

The Cockle Separator.—This machine occupies a place higher even than the separator in the estimation of millers. There are many varieties of cockle, but the one most troublesome to millers is that known as *Lychnis Gilhago*. It is a very hardy and prolific plant, and when the seeds are ground in with flour the latter has the effect of cantharides, a deadly poison, upon the human system; hence it is imperative that the cockle-seed be taken out of the wheat. The success of American inventive genius in this direction is matter for just pride and satisfaction. In Europe, of which cockle is a native, several methods of separating it were tried, but none proved so effective as the work of the American machine, the invention of Kurth, a German. The machine here illustrated separates it almost entirely from the wheat and is simply indispensable in modern mills. The engraving shows the interior of the machine, which is enclosed when in operation, the cylinder being cut open and the entire internal economy of the machine being shown as in operation,(Fig. 2).

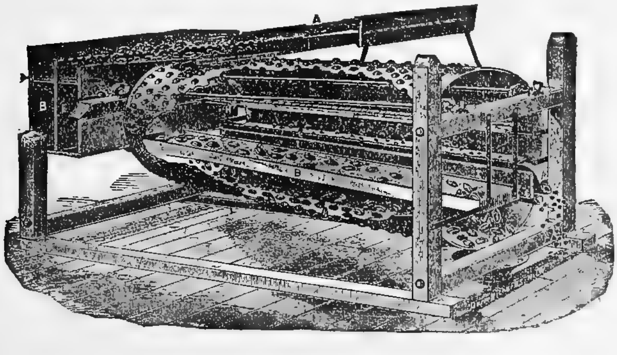


Fig. 2.

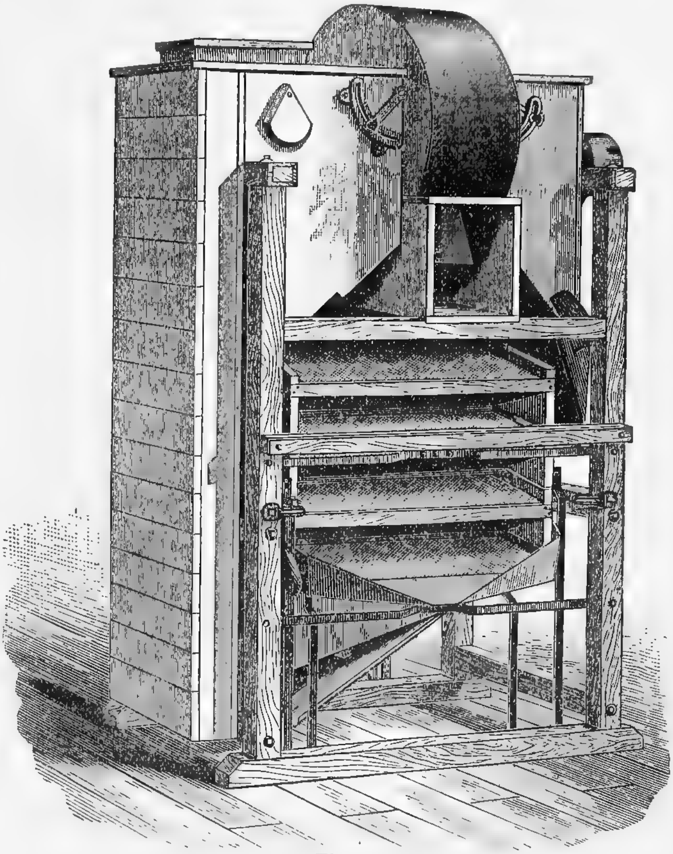
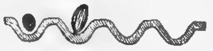


Fig. 1.

There are no holes in the indented cylinder. The grain first falls on sieve A, the larger berries passing over the tail into division B, thence along spout B, and discharging into hopper C. The smaller grain and the cockle fall through sieve A, pass through division E, entering the indented cylinder F at the rear end, the cockle fitting into the indentations, and thus, by the revolving of the cylinder, being carried up past the catch-board, fall on the same and roll into the spout, being, by the shaking motion of the same, discharged, as the cut shows. Only the ends of the kernels of wheat can stick into the indentations, thus:  they consequently fall out before reaching the catch-board, slide back to the bottom, and at the same time are impelled by the motion and inclined position of the cylinder towards the hopper C, where they mix with the large wheat from the tail of sieve A, or can be kept separate, if desirable, thus making two grades of wheat.

The Scourer and Smutter.—After the wheat has been cleaned of what may be called field impurities, including cockle, it passes to graders, which separate the small, shrunken, or imperfect kernels from the plump and sound ones; thus enabling the miller to keep up his higher grades of flour by using only sound wheat, while the inferior quality may be kept separate and reduced to lower grade flour. This grading is, perhaps, more generally practised in mills using soft wheat exclusively than in those which use mainly hard wheat, with only a sufficient mixture of soft to expedite its reduction. Graders are of too common a type to require illustration or extended description.

The next operation is a radical one, consisting of the passing of the wheat through a machine known as the scourer and smutter, a large variety of these necessary adjuncts to milling having been invented. Crease dirt, while hardly perceptible to the casual observer, is peculiarly abhorrent to the good miller, and must be taken out before pure white flour can be made. The machine illustrated is the invention of Morgan, now a resident of Wisconsin. This scourer, one of his many valuable inventions, was first exhibited at the Wisconsin State Fair in 1845, where it was awarded first premium, though then regarded more as a curiosity than a practicable machine. It has since come into very general use, although there are many competitors, some of which are regarded as superior to it, in that the same work is done by gentler means. A sectional view of this scourer is here given. (Fig. 3).

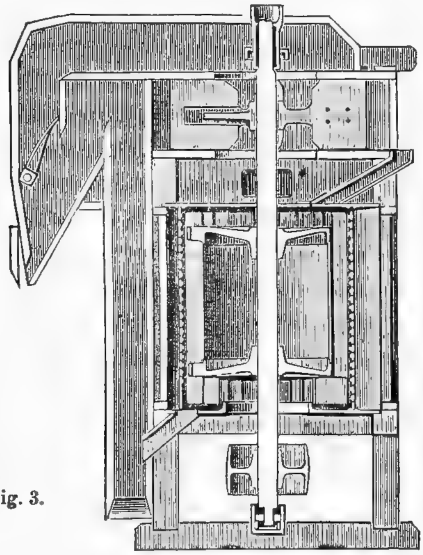


Fig. 3.

The Scourer consists of a number of beaters, mounted on a vertical shaft, surrounded by a case of perforated metal with oval indentations on the inner side, presenting an uneven surface to the scouring case. The perforated metal case is surrounded by a tight wooden case, shaped as in the engraving, and at the top of this is a suction fan for the removal of the impurities taken off in the cleaning operation, which may be thus described: The grain being fed in at the top of the machine, passes through an air-current which draws out any light material or dust that may remain in the wheat, which then falls upon a disc that throws it to the scouring case, where it is caught by the beaters and carried around the machine at a high speed. Coming in contact with the uneven surface of the scouring case, the wheat is subjected to a severe rubbing, which removes the fuzz from the end of the berry, together with any dust or impurities that may adhere to the berry. In passing out of the machine the wheat is again subjected to a strong current of air, which separates light wheat and other light substances from the clean grain by specific gravity. The grain, while being subjected to the scouring process, is acted upon by a current of air coming into the machine in the centre at the bottom, passing through the grain and out through the perforated case, up and between it and the outer wooden case to the fan on top of the machine, taking with it all impurities detached from the wheat.

Another valuable machine has come into general use during the wheat-cleaning process as the direct result of the employment in the harvest-field of self-binding machines which use wire as a binder. It is inevitable that bits of wire should get into the wheat while going through the thresher, and before wire binders were used, nails, screws, and bits of iron often found their way into the grain. It will be readily seen that such things are a source of annoyance and loss of time and money to the miller. A simple machine known as the magnetic separator, built on several patterns, serves the purpose admirably. In them the wheat is passed over a series of strong magnets and all metallic substances are removed, the machine being so constructed as to allow of easy and frequent cleaning of the magnets.

The Roller Mill.—The necessity for this machine arose from the desire to produce the greatest possible amount of middlings in the breaking of wheat, and the smallest amount of flour, without rubbing the impurities into the material or comminuting the bran. It is superior to the millstone for this purpose, as being more gentle in action, more easily regulated to the demands of various products, and more susceptible of close and accurate adjustment. While attempts at using rollers for milling were made both in Europe and America prior to the invention of the middlings purifier, their success was extremely limited. Its real development was consequent upon the wide possibilities of gradual reduction as demonstrated by the purifier, and its spread proportionate to the comprehension and use of that machine.

Collier of Paris, Bollinger of Vienna, and Helfenberger of Switzerland, began experimenting with the roller mill about 1820. The Helfenberger mill had two grooved rolls, arranged side by side, with a board of hard wood fixed beneath and in close contact with them. Bollinger Bros. of Vienna made a mill with three hardened iron rolls, two side by side and having grooves winding in opposite directions, while a third roll was located beneath and parallel to the others. These rollers had differential speed, revolved in different directions, and were the most perfect of any made up to that time. Collier's rolls were conical, with axes parallel and the greater diameter of one roll adjacent to the smaller diameter of the other. A. Von Mueller, councillor of Warsaw, also invented a roller mill superior in some respects to Helfenberger's.

About 1830, Sulzberger, a Swiss milling engineer, succeeded in building a mill better than any which preceded it. This machine had three pairs of grooved rolls 6 inches in diameter, arranged one over the other. The grain was broken on the first, the middlings and finer material detached by the second, and reduced to flour by the third pair. Their speed was differential, the slow roll making 216 and the fast one 229 revolutions per minute. A company was formed by Sulzberger for introducing the mills, and establishments were built in Milan, Venice, Munich, Mayence, Stettin, Leipsic, Pesth, and other places, on his plan. It was, however, found difficult to procure intelligent workmen to operate the mills, and equally hard to accustom the public to the dry, roller-milled flour, and teach them how to use it. For this reason all the altered mills save one or two, notably the one at Pesth, returned wholly or partly to the use of stones. The Pesth mill was a success, and continued to use the same roller system for many years. The process was kept secret to a great degree, though it was known that the rollers frequently broke, necessitating many repairs.

Naeff of Pesth invented a roller mill which came prominently into use after that of Sulzberger, and was manufactured about 1864 by Escher, Wyss & Co., of Leesdorf, near Vienna. This machine had four rollers, placed one above the other. The use of these and the earlier rollers was, however, not at all general for some years. They were employed in a few large establishments for breaks, while the ending and flouring were done on stones. The reconstructed Pesth cylinder mill, in 1867, seems to have been the first successful exclusive roller establishment. There were in this mill 210 pairs of rolls, arranged in 5 sections, 2 of which were for making middlings, and the remaining 3 for their reduction into flour. Two or three other mills at various points adopted the same system on a smaller scale, but without as great success.

A difficulty in dealing with roller mills, which had been all along the greatest of any, was the impossibility of procuring any material for them which would prove alike durable and cheap. But about this date the manufacture of iron and steel was being fast developed, and erel ong the chilling or hardening process, applied to iron rolls, resulted in a surface comparatively durable and satisfactory, though at first far from cheap.

While the use of the improved iron roll was spreading very slowly, Franz Wegmann of Naples exhibited his porcelain roll at the World's Exposition in Vienna in 1873. Wegmann's roll, made of porcelain or biscuit china, had a fine, smooth, yet granular appearance. So great were its apparent virtues that it was adopted by various stone mills of Pesth, where it was originally used for sizing middlings, rather than for reducing them to flour. Wegmann also made rollers for Ganz & Co., of Budapest, but in chilled iron of which they were manufacturers, instead of porcelain. In 1875 the use of the rolls, of one sort or the other, spread rapidly in Germany, and at exhibitions at Vienna in 1875 and Nuremberg in 1876 many different makes were shown. It was at this time that the roller flour of Pesth began to obtain the wide reputation in Europe which it so fully achieved later on.

Of the two porcelain roller mills first brought to America by Oscar Oexle, a milling engineer, in 1873, E. T. Archibald, of Dundas, Minn., secured one, and, it is supposed, Hecker & Co., of New York city, the other. As the complement of the purifier, put in use in America but a few years before, the roller was favorably received and was disseminated with little delay. The experimental mill of 100 barrels' capacity, built in one end of the Washburn C mill, at Minneapolis, in the winter of 1878–79, was the first attempt at genuine roller milling made in America. This mill contained sharp corrugated iron, smooth iron, and porcelain rolls. It proved such a success as to give a powerful impetus to the general introduction of roller milling.

Fig. 4.

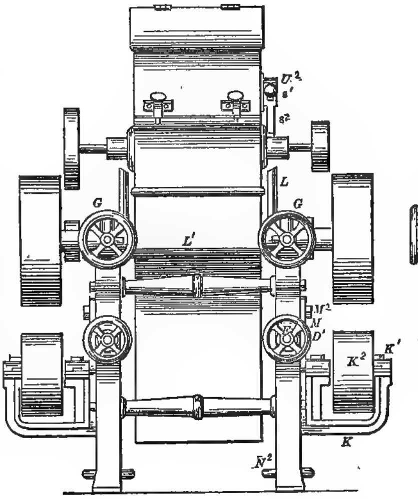
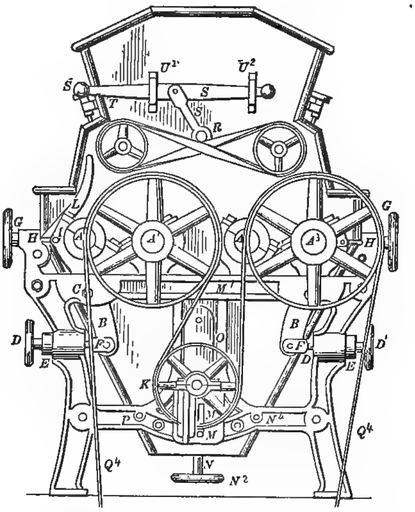


Fig. 5.



It should be said, in considering the employment of rollers in America, that they were used experimentally in some mills at a date nearly as early as that of their invention in Europe. A patent is recorded, issued before 1840, the claim of which embodies the use of rolls for reducing grain. Such rolls, first employed in crushing wheat, were clumsy affairs, many of them 30 to 40 inches long and 18 in diameter. Ordinary cast-iron, and, earlier, granite, stone, and marble were the materials employed. Afterwards chilled iron rolls were produced and used for making a germ separation, and, later on, for wheat reduction. Their construction was clumsy and faulty in all respects, their means of adjustment with regard to distance being so poor as to result in flattening instead of granulating the stock. With the importation of the first corrugated iron rolls for reducing wheat, a great change took place. The imported rolls being of very superior construction, our mill-builders quickly perceived their valuable points and set about to furnish better machines. So great was their success, that it may with perfect truth be said that American roller mills now surpass all others for convenience and ingenuity. From rolls of 30 and 36 inches in length and 10 and 12 in diameter, they were altered, after the change in grinding methods, to 18 inches in length and 9 in diameter. At present machines much smaller are made by way of supplying the requirements of small mills. Yet, though both longer and smaller rolls are made and much used, 9 by 18 may be considered the standard size. Among the foreign innovations was the belt drive, which was well received as being lighter-running and much less noisy.

According to early practice a single pair of rolls was customary in a frame, but the common and nearly universal practice of late years is the use of two pairs, as being more economical and convenient, as well as more perfect mechanically. Mills having four pairs of rolls are built, but their use is somewhat exceptional. An arrangement of three rolls placed one above the other, and designed to save space and power by doing the work of two pairs, originally invented by Daverio of Switzerland, after Wegmann's porcelain rolls, is also made in America and is finding many advocates.

The rollers, as employed in general practice, are grooved for reducing wheat to middlings and also for cleaning bran. The corrugations are of many angles and degrees of sharpness, each maker having patented a theory of his own on the subject. Ordinarily they have a slight spiral twist from end to end to prevent interference in differential driving. The fineness of corrugation depends on the material to be treated, those on the first breaks being coarse, with a gradual change as the material is more and more reduced. The smooth rolls are employed mainly in the reduction of the purified middlings to flour, and are set closer and closer as the particles of stock grow finer, the same being true of corrugated rolls on breaks.

The object of the breaks of wheat in roller milling is to crush the grain so gradually and gently as to liberate the impurities and detach the bran from the granular fragments of the grain, making at the same time as little flour as possible. The object of the reduction of middlings is to so flatten the germ that it can be easily separated, and to powder the detached and purified particles by gentle and cool pressure, so that the flour resulting will be granular and strong, as well as white.

There are eighteen or twenty firms in the United States at present engaged in making roller mills. Of these some manufacture all styles and sizes, and others but one or two. The essential principles involved are the same in all, the difference on which the various patents rest being details of construction, drive, or adjustment. The engraving here given represents end and side sectional views of a modern type of roller mills, if a machine so recently come into general use can be styled modern.

Figs. 4 and 5 show a roller mill with two pairs of rolls. The inside ones have stationary bearings; the outside ones movable bearings. *D* is a nut and hand-wheel which engages screw *F*, passing through a chamber in the frame and a coil-spring and attached to the bar *B*. By tightening the nut *D* the spring is compressed in the chamber and acts on the roll bearing through the fulcrum *C*, pressing the movable roll against the stationary roll. The hand-wheel *G* also engages a screw passing through a hole at *H* in the roller frame and connects the movable bearing *A*; by tightening the screw the rolls are held apart, the object being to prevent the rolls from coming together in case the feed accidentally runs out. *K* is a tightener pulley held in place by the movable plate *M*, moving in a chamber *O*; *M* and *N*, a screw and hand-wheel for adjusting the pulley just mentioned. Each roll has a driving pulley, the differential motion being arranged by the use of pulleys differing in diameter. *R*, a shaft running through the hopper of the machine and connecting with bars *S S S*, is a device for shutting off the feed.

After the wheat has been cleaned upon the usual separators, smutters, and brush machines (and cockle separators where necessary), it is spouted to the first pair of rolls, which sometimes have four to eight corrugations per inch of circumference, as shown in the accompanying engraving: (Fig. 6).

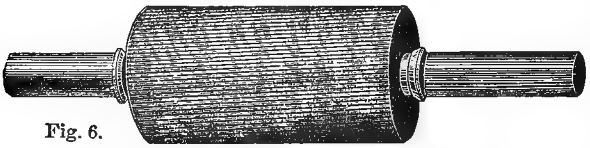


Fig. 6.

This is intended to split the wheat berry through the crease, for the purpose of liberating the germ and the impurities contained within the crease which are beyond the reach of the wheat-cleaners. This split wheat is then sent to a wire-covered scalping reel, to sift out all germ, crease impurities, and a very insignificant amount of middlings and flour; in good milling the proportion being 90 to 100 pounds for each hundred barrels of flour, so that it is after this break that the actual manufacture of flour commences. The second break is on the wheat which tails over the end of the reel above mentioned, and through spouts to the second pair of rolls, which have finer corrugations and are set closer together than the first set. This crushes the broken wheat slightly, resulting in a yield of middlings and a little break flour. This chop is then sent to the scalping reel, where the flour and middlings sift through, and the remainder passes over the tail of the reel to the third break. The break stock from the tail of the second scalping reel then passes to the next pair of break rolls, having still finer corrugations and set still closer together, and then to the third scalping reel, when the middlings and flour are separated from the chop as in the second break. The break stock from the tail of the third scalping reel then passes to the fourth pair of rolls, where it is still further reduced by finer corrugations and closer setting. From these two breaks is obtained the greatest quantity of middlings. The break stock from the tail of the fourth scalping reel, now nearly reduced to bran, is sent to the fifth break rolls, and thence to the fifth break scalping reel, where separations are made similar to those above outlined. The sixth break is the last step in the reduction of the wheat berry, and with it ends the use of the corrugated rolls, the process being the same as those preceding it, except that the bran passing over the tail of the sixth scalping reel may be sent to the bran duster, the middlings which have been made and separated on the six breaks outlined going through purifiers before again passing to rolls, and being then reduced on smooth instead of corrugated rolls. On some kinds of wheat, seven and eight breaks are deemed desirable, but commonly six is the highest number used. In small mills, to save expense in machinery, it is customary to reduce the wheat in four or five breaks only; but while even this is a long step in advance of the old style stone milling, it results in an increased percentage of flour from the breaks, and a decreased percentage of middlings, thus defeating, in a measure, the chief aim of gradual reduction milling.

In bolting, the flour and germ sifting through the first break and scalping reel are sometimes sent to the offal or feed bin, but in many cases are rebolted for a low grade of flour. The flour and middlings sifted through the bolting cloths of the second, third, fourth, fifth, and sixth break scalping reels are collected and sent to the proper reels for the purpose of separating the flour from the middlings. The resultant flour is then sent to other reels, properly clothed, and is redressed, the product being what is known as bakers' or the third highest grade of flour. The middlings, after being properly dusted and purified, are then gradually reduced to flour by a series of processes similar to the breaks of the wheat. That is, the coarser middlings are crushed on smooth rolls to finer middlings, and the flour being bolted out after each crushing until, in all roller mills, nothing remains but the feed. The germy middlings, the light fluffy materials, and other offal containing some traces of flour, which are taken out during the various stages of this gradual reduction of middlings, are further reduced to low grades of flour and to offal. There is yet considerable diversity of opinion among advanced millers as to the proper method of reducing a certain grade of fine middlings, when a point is reached where the smooth rolls flatten most of the stock and make a little poor flour, but the weight of opinion and usage is in favor of handling this stock on the millstones, for which greater capacity is claimed as well as the obtaining of a granular flour of better color and strength and with less manipulation than by the reduction to the end on rolls. Most millers who use and advocate this use of the millstones say that if compelled to throw out the stones they would employ porcelain rolls to finish the fine middlings, but as to this there is much diversity of opinion, even among the most successful millers.

Flour and Middlings Graders.—The middlings and flour resulting from the first six breaks of the wheat are referred to as going to scalping reels, etc. These consist of a series of centrifugal or other reels, bolting chests or machines, of various patterns and covered with different numbers of wire cloth and silk gauze, the numbers representing the various degrees of fineness of mesh. These machines are of a common type, or so much so as not to require illustration or description, that given of the centrifugal reel being sufficient to indicate the office and style of construction of these machines, although some of them resemble the illustration of the centrifugal but slightly.

The Middlings Purifier.—The province of the purifier is to remove the impurities and fine material, and notably the bran particles, from granular product resulting from the gradual reduction of the wheat berry. Working by specific gravity and adjustable to middlings and impurities of varying degrees of fineness, it entirely eliminates the greater part of those foreign or discoloring substances for which there was no adequate remedy prior to its invention. Originally its use was peculiarly applicable to the reduction of very hard wheat, in which the middlings were the glutenous portion next the hull. These had invariably adhering particles of bran, which there was no rational way of removing. Yet in case they were ground together the resulting product was but little better than cattle-feed. The desire to improve this product suggested the invention of the middlings purifier. High grinding increased the quantity of middlings and made the need of such a machine more evident. Its invention and adoption marked an entire revolution in the art of milling, the roller mill being but its sequence, developed by high milling, which is simply the production of the least amount of flour and the largest quantity of middlings in the preliminary breaking of wheat.

It may be said that the term middlings is now applied indiscriminately to the granular products resulting from the gradual reduction of wheat. The application of the machine in practice has thus become extremely broad, it being considered as much a necessity in winter wheat milling as among the hard wheat mills where it originated.

Ignaz Paur, or Paur, known as the father of high milling, and born at Tattendorf, Lower Austria, 1778, invented about 1810 the first purifier of which there is record. The machine was the result of an effort to facilitate the work of cleaning middlings, in order that more of the product known as "extract flour" might be made. The demand for this flour, which Paur produced by regrinding the purified middlings, was greater than he could supply with the use of hand sieves only in purifying. He therefore experimented, and finally, with the aid of Winter, a cabinet-maker, made machine, Fig. 7.

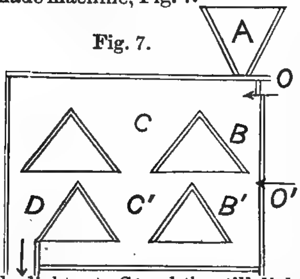


Fig. 7.

A is the hopper from which the brokengrains fall into the purifier. O is an opening through which a current of air is drawn in upon the falling middlings. The heaviest fall through the division B, the next heavier fall at C. What falls through B encounters a current of air from O′ which carries the lighter to C′ and the still lighter is carried over to D. Thus the currents separate the middlings into three grades.

From this beginning the use and improvement of the purifier in Europe seems to have spread to some extent, and there is every reason to presume that it was considerably employed in the best Austrian, German, and French mills perhaps thirty years before any knowledge of it found its way across the Atlantic. G. H. Christian, of the Washburn mill, Minneapolis, visiting France about 1870 in search of information with regard to purifying, saw the Cabanas purifier, invented in 1855, at work there, and brought home a machine of this patent which was used in the Washburn mill up to the time of the great explosion in 1878. This purifier had a sieve suspended, with both horizontal and vertical reciprocating movements, and enclosed in a box. It had a pendant cloth attached to its interior border in such a manner as to confine the air between the lower surface of the silk and the bottom of the box. The current of air produced passed from below upward through the silk, thus lifting the lighter particles and effecting a separation.

Until 1866 the only middlings purifying attempted in America was by means of sieves, or, as practised by Oliver Evans in 1836, on the ordinary bolting reel. This was done to clear the product so far as possible from bran and impurities, when, being reground, it occupied a place intermediate between flour and feed. But the production of middlings was carefully avoided by Evans and all other American millers, for, though they were known to contain rich and nutritious elements, there was an entire lack of means and knowledge to utilize them. As they formed comparatively a small proportion of the whole product prior to the practice of high milling, no strenuous efforts to turn them to account more satisfactorily were made in this country for many years.

In 1866 Jesse Ames & Sons, of Northfield, Minn., having accidentally discovered the virtues of high grinding, experimented with various devices to purify the large quantity of middlings resultant upon that mode of reduction. One method was in blowing a blast of air through a falling stream of middlings, but as they were not of the same size this did not work well. They were then run into an eight-sided reel into which a blast of air was blown, a plan proving the most successful of any tried. In 1868 Nicholas and E. N. LaCroix were experimenting with and operating in Faribault, Minn., a machine described as a box with a sieve on top of it and an air-blast under the sieve. This is the earliest account given of the use in this country of sieve and air-blast in middlings purification. Their machine was an imitation of the patent of one Perigault, which LaCroix had seen working in France. In February, 1870, La Croix built for George H. Christian, then manager of the Washburn mill at Minneapolis, an imitation of this Perigault purifier, and the machine was run several weeks in the Washburn mill, where it proved the value of the principles involved, but was not successful enough for practical use.

These experiments were carried on with the utmost secrecy, but E. T. Archibald, of Dundas, Minn., who had lately built a new mill, induced LaCroix to make another purifier for him, which, completed late in the year, he placed in his mill-attic and began also to experiment secretly. Having by hard and slow work accumulated 100 barrels of middlings, he had them ground on a stone. The flour resulting was shipped to New York and Boston, and was the first flour made by the middlings purifying process to be marketed in America. So great was its excellence that its price rose several dollars above that of what had previously been considered the best flour.

After LaCroix's purifier went out of use in the Washburn mill, because of its defects, George T. Smith, then head miller, began to experiment with it. He saw that the great need was a brush to keep the meshes of the cloth free, and this he successfully supplied. Profiting by his own study of the principles involved, he developed one improvement after another and embodied them in a purifier which was constructed under his personal supervision in that mill.

This machine contained the following new elements: An upward air-current through the covering of a reciprocating sieve, clothed with silk of progressively coarser mesh from head to tail; an enclosed air-space above the sieve, divided by transverse partitions into separate compartments, having practically no communication with each other, and each opening into the chamber of an exhaust fan through an adjustable valve so placed as to permit the regulation of the strength of the air-current through each compartment separately; a series of dust-settling chambers or testing drawers corresponding in number to the compartments above mentioned, and a brushing device automatically operated, and working against the under side of the sieve clothing. The principles of purification which this organization was adapted to carry out, and the general plan of construction followed by Mr. Smith in building his first purifier, have since been steadily preserved in the manufacture of this machine. The accompanying Fig. 8 gives a longitudinal vertical section.

A is the frame-work. *H* the hopper into which the middlings to be purified are spouted. *K* a feed roll for delivering them to the sieve *M*. *Y* is the brush carried by endless chains, and arranged to sweep the under side of the sieve cloth from head to tail. *G*, *G*, *G*, the compartments above the sieve. *F*, *F*, *F*, the dust-collecting chambers or drawers. *E*, *E*, *E*, the adjustable valves, opening into the air-chamber *D*; and *B* the exhaust fan. Motion imparted to the driving pulley *R* puts all parts of the machine into operation as follows: the sieve is rapidly reciprocated horizontally, and from the manner in which it is suspended has also a very slight rising and falling movement, which causes material delivered to it to flow from head to tail. The middlings are fed on to the sieve in a broad, thin stream by the feed roll *K*, at its head, where the silk covering is finest, and a very slight air-current, regulated by the valve *E*, is drawn upwards through the first compartment *G*, barely sufficient to float the lighter impurities, and not sufficient to prevent the small, fine middlings from passing through the silk, thus avoiding the loss which would follow an ungraded air-current, strong enough to remove the heavy impurities through such a current, carrying the small middlings with the impurities to the fan. As the middlings flow along the sieve, and pass from fine to coarser silk, the strength of the air-current through each succeeding compartment is increased as may be required to suit the stock being purified, the character of which constantly changes as the smaller middlings pass through the progressively coarser sections of silk. The continuous air-currents upwards through the sieve cause fine particles of dust and flour to adhere to the under side of the silk, and granules of middlings too large to pass through become wedged into its meshes on the upper side. These are removed by the brush *Y*, which is arranged to sweep the entire under surface of the sieve covering at intervals of a few minutes. The air-currents drawn up through the sieve carry a large quantity of dust and other impurities, and are made to pass across the open tops of the dust-settling chambers, or drawers, *F*, on their way to the fan, thus producing an eddy, which causes the heaviest and best portions of the material carried by the air to be deposited in these drawers. Access to them is conveniently had, and an examination of their contents will at once inform the operator whether any good material is being taken out by the fan, and if so, from which section of the sieve it comes, so that he may know where to reduce the current by means of valves *E*.

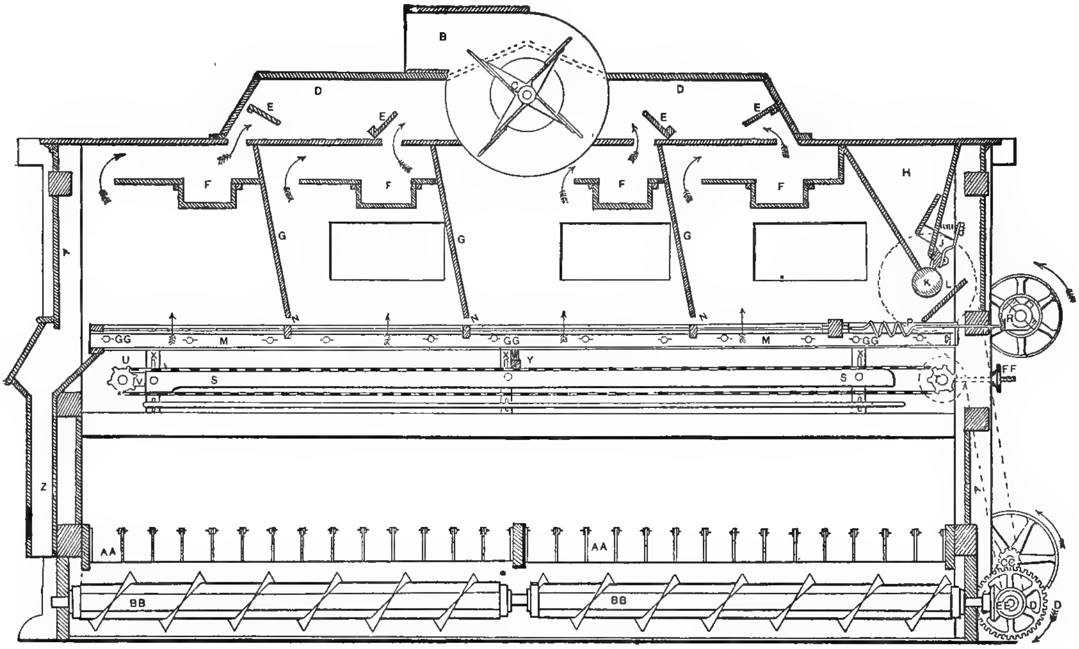


Fig. 8.—Sectional View of the Geo. T. Smith Purifier.

All of Smith's inventions were patented by him, and although some of his devices were claimed by Lacroix, Christian, Barter, and others, giving rise to much controversy and costly litigation, Smith was finally awarded priority over all contestants. Amongst the first to adopt Smith's purifier and system were C. A. Pillsbury, of Minneapolis, and E. T. Archibald, of Dundas, Minn. As is the usual experience of inventors, there were several imitations of Smith's machine, and efforts were made to break down his patents; but he was able not only to successfully defend himself against both classes of attacks but to organize and build up a great company on the basis of his patents, which under his management has grown into one of the largest manufactories of any kind in the United States, and the largest of its class in the world.

Flour Purifying.—The latest development of modern milling contemplates the application of the principle of purification by specific gravity to flour as well as to middlings. This process, which is as yet in an experimental state, aims at the production of a very large proportion of white flour. Its inventor assumes that when all possible impurities are eliminated from middlings, there still remain many which inevitably enter the flour, and he claims that it is practicable to take such worthless material out and thus lessen the proportion of low grade and increase the quantity and value of higher qualities. He admits that, by the use of this process, the already complicated and costly machinery of milling will be rendered still more complicated and costly, but he expects to offset this drawback by the greatly improved value of the product.

The Jonathan Mills Flour Dresser.—In this machine, which is enclosed like all bolters and very similar in external appearance to the centrifugal, is a round reel, covered with suitable numbers of silk and supported on several flat, tempered, steel hoops running around the reel. The heads are cast solid and are fitted with V-shaped troughs in their circumferences. Into these and inside the silk are fitted 24 staves, so joined together that the cylinder is solid, but with a zigzag surface of V-shaped grooves throughout its length. Six or seven inches back from the reel head, at each end, every other stave is cut out, leaving apertures through which the stock is fed on the silk. Being fed in at the head by screw conveyer, it falls through the openings on the cloth and rapidly makes its way to the tail of the reel, where it drops through the slats and is carried away by conveyer. For keeping the cloth clear there is an arrangement of bristle brushes, so suspended over the top of the reel as to rest on the cloth.

The Jonathan Mills Disk Machine.—This reducer works on a principle combining the action of stones and rollers. Its grinding surface is furnished by two horizontally placed chilled iron disks, of which the lower is the runner and the upper is stationary. These disks have a depressed face to within a few inches of the periphery, leaving just space enough for the wheat to pass flat. The skirt of the disks is corrugated, and there are also several leading grooves, or corrugations, in the depressed face. The speed of the machine being high, the product works along the leading grooves by centrifugal force and passes on the corrugation of the skirt, where it is crushed, different adjustments and corrugations being made for varying degrees of fineness.

Other disk machines, either horizontal or vertical, and employing knives, rings, pegs, or other comminuting devices on their working surfaces, are also in use, though their employment is not extensive, comparatively.

The Morse Elevator Bolt.—As its name indicates, this apparatus consists of an elevator system in combination with a bolting sieve. The sieve is inclined at a slight angle and the stock is fed on it by a system of rows of buckets mounted on an endless belt running around the drums. The stock is fed into the buckets by a suitable device, elevated over the upper drum and delivered on a cantboard, whence it falls on the inclined screen, sliding down its whole length. Appropriate mechanism returns what remains upon the screen to the buckets, so that the operation may be repeated to any desirable extent. Stock of varying fineness or character may be fed into the different rows of buckets, the screen being, in such case, clothed to suit the material.

The Centrifugal Reel.—This reel, introduced into America by a Swiss inventor in 1880, differs from the ordinary bolter in employing various devices of beaters or wings on an axle in the centre of the cylinder, the design of which is to secure a tangential or throwing movement of the stock, instead of the sliding movement of the ordinary reel. As the beater action makes the bolting more intense, the centrifugal may be, and is, considerably smaller than the old bolt. Its length differs with different makers from 6½ to 11 or 12 feet over all; width of frame from 3 to 4 feet; height of frame from 4½ to 5½ feet. The beaters, of various shapes, length, and sizes, are arranged spirally about the central axle, and by their action in motion create a vacuum which prevents the stock from dropping to the bottom of the reel. The frame on which the cloth is stretched is in some cases six- or eight-sided, and in others circular. The ribs bracing the cloth are of various designs, some having in view supplementary effect in keeping the stock going from silk to beaters. Devices are now in use involving the use of shovels or scoops so fastened on the frame of the reel as to swing with its motion, and thus, after collecting the flour, throw it, as the reel passes around, again on the beaters. The centrifugal has been found especially applicable to stock of a flat, soft, or somewhat lifeless character, on which its rapid and vigorous action has a disintegrating effect. It is not regarded as likely to supersede the ordinary reels, though a few mills have been built of late using no other style of bolting. By millers in general it is considered a valuable supplement to the old reel, and a relief to the work of the purifiers. It is manufactured by several American mill-builders, the patents not referring to the principle, as in the case of those on roller mills, but to the details of construction. Much diversity exists in this way as to shape, size, and length of beaters, form of ribs, manner of clothing the cylinder, etc. The illustration shows the machine with a portion of the outer case, as well as of the cloth on the cylinder, removed to show the inner workings, while another reel in the background is reversed to show its drive-gearing. (**Fig. 9**).

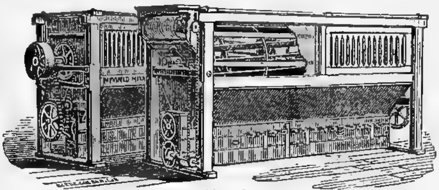


Fig. 9.

The Dust Collector.—Flour-dust, which is the inevitable attendant of the rudest milling, was vastly increased in quantity by the complicated reducing and sifting processes of gradual reduction. The use of the purifying and aspirating machinery, distinguished by the employment of air in rapid motion, kept vast quantities of fine dust constantly in suspension in the air of mills employing such devices. Although an effort was made to remove this substance by blowing it into rooms designed for the purpose, the process was more or less ineffectual, much dust escaping removal or finding its way back into the mill. When, after a time, a series of disastrous explosions occurred in great mills employing improved methods, it was discovered that the fine flour-dust was the cause of this lamentable destruction of life and property. Suspended in large amounts in the dry air of the mills and dust-rooms, it was shown to possess the explosive qualities of gunpowder. Efforts were at once made to replace the ineffectual dust-rooms by some better device, these efforts resulting in the machine known as the dust-collector.

It consists of an enclosed cylinder with inner and outer ribs, around which flannel is wound from one piece, so that when complete there is an air-space the width of each rib between two flannel surfaces. The dust and air are drawn into the machine by suction, and forced through the flannel into and through the spaces between the inner flannel surfaces and on to the centre of the machine or cylinder, whence the air passes out of either end, both being open. The cylinder is revolved slowly, rib by rib, by a ratchet, and as each rib reaches a point directly over the centre of the bottom of the collector, it is tapped lightly by a knocker, which causes the dust, arrested by the flannel, to drop into a conveyer which carries it away from the machine. By a peculiar construction of the machine a reverse current of air is drawn from the outside through the flannel in such a way as to facilitate the thorough cleaning of the cloth.

In addition to the merits of the dust collector as a preventive of explosions, it is effectual in saving the good material blown from the purifiers, as in the old dust-rooms a very large portion of this was blown out and wasted. The dust collector has also much shorter spouts for connection with the purifiers, if it is not, as in most cases, placed directly upon them. Thus the long spouts necessitated by the dust-room, which occupied much space, and acted as the most destructive of conductors in case of fire, have been to a great extent displaced by the device in question. The illustration shows the machine in perspective, with the doors removed, showing the "balloon," or cylinder, and the end section of the latter, clothed with flannel; the arrows indicating the course of the air-currents. (Figs. 10, 11).

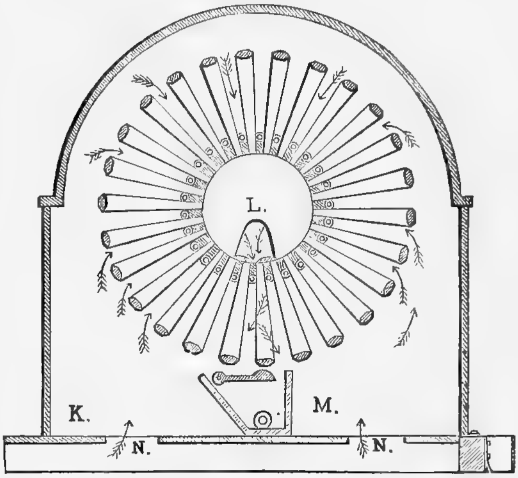


Fig. 10.

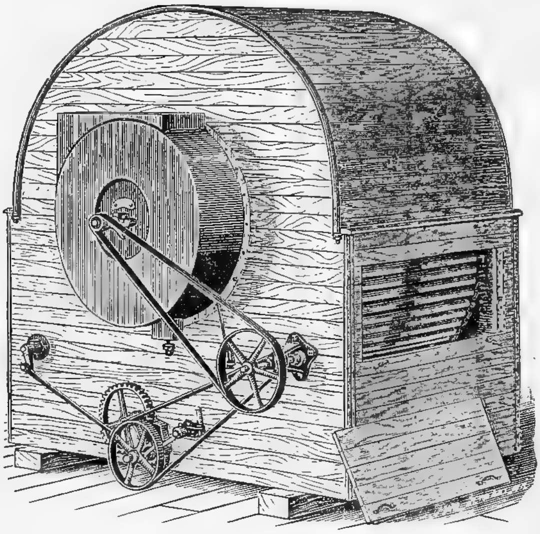


Fig. 11.

The Bran Duster.—This is a machine which was long desired, but is of very recent invention and construction on correct principles, and has become another of the appliances indispensable in successful milling. A fair type of the several varieties in use is a machine with an upright cylinder, covered with a fine wire cloth, the cylinder having adjustable brushes on the inside, secured to the central arm in such a way as to very nearly touch the cloth. This cylinder revolves rapidly, usually about 300 revolutions per minute, and the bran, being fed into it from the top, must pass between the brushes and the sides of the cylinder. In getting through it is so thoroughly swept by the brushes as to remove from it all adhering particles of flour, which is forced through the wire cloth, while the cleaned bran falls down and is carried away to the feed-bins. An automatic knocker prevents the cylinder from becoming clogged, while the wooden case confines the material to the machine. Herewith is an illustration of the bran duster. (Fig. 12).

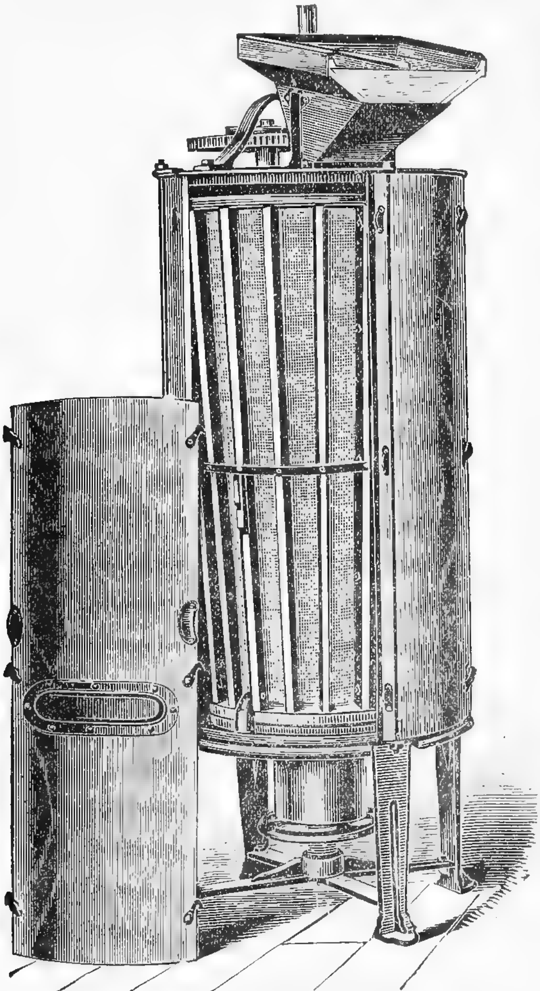


Fig. 12.—A Bran Duster.

When the flour of the various grades has been separated and carried to the bins provided for each, it is packed in barrels or sacks, as is desired. In all well-regulated flour-mills, the packing device is attached to the hopper of the bin, and when set in motion does its work rapidly and well, with little dust or waste. The packer is a simple yet ingenious device. It connects directly with the bin and has removable tubes, the lower ends of which are adaptable to sacks and barrels of various sizes. The general style of packers is the same, and it is equally well adapted to filling the 2 lb. sack, the half-barrel, or the 280 lb. export sack, the largest package used. Flour which goes abroad is put into jute sacks, mainly of 140 lbs. weight, but often in cental and in 280 lb. sacks. For domestic trade, paper and cotton sacks and oak or elm barrels are used exclusively, although of late attempts have been made to introduce a paper barrel. The handling of packed flour has been reduced to great precision in late years, the results being a marked reduction in the cost of operating mills.

Statistics.—In 1880 there were in the United States 24,338 flouring-mills, employing $177,361,878 capital and 58,407 operatives. The aggregate wages paid yearly was $17,422,316, making 99½ cts. per day to each operative, estimating the working year at 300 days. Operating 59,612 runs of stone, these mills had, at that time, capacity to grind 4,780,106 bushels daily. The total value of all grain ground in 1880 was placed at $441,545,225, with resulting products worth $505,185,712. Partial statistics of the ten leading States at that time are shown in the following table :

	Mills	Capital.	Wheat. (Bushels.)	Other grain.	Value of products.
New York	1,768	$19,545,994	19,904,896	34,814,643	$49,331,984
Illinois............	1,024	13,579,680	34,287,427	15,721,729	47,471,558
Pennsylvania ..	2,873	20,238,601	19,081,580	25,860,256	41,522,662
Minnesota........	436	10,510,362	35,264,005	2,040,064	41,519,004
Ohio................	1,380	12,328,847	26,691,762	11,409,117	38,950,264
Missouri	872	7,883,675	24,402,229	9,471,767	32,438,831
Indiana	996	9,484,023	21,682,123	2,906,588	29,591,397
Wisconsin.........	705	9,199,735	19,616,905	9,698,086	27,039,430
Michigan.........	706	7,704,464	15,442,842	8,985,989	23,546,875
Iowa	713	7,890,859	14,604,382	11,509,181	19,089,401

Of the flouring mills in operation at present, probably from one-third to one-half work on the new process or gradual reduction system, or some more or less complete attempt at its methods. While the whole number of mills has undoubtedly much increased, especially in the hard wheat section of the middle and extreme north-west, the increase in flour production is proportionately much greater. This is owing to the fact that in altering from the old process to the new, machinery sufficient for a greater output has usually been added, and also because a very large proportion of the new mills have been those of the merchant class. A careful compilation of returns from 430 principal merchant mills in seventeen chief milling States and Territories, with perhaps a few in other States, gives an aggregate daily capacity in 1885 of 146,031 barrels, with a flour product for the crop year of 24,563,364 barrels.

The total export for 1885 from all American ports was, in wheat, 52,702,036 bushels; in flour, 9,548,358 barrels. In 1884, 80,627,215 bushels of wheat and 9,047,071 barrels of flour were exported. Exports of wheat and flour estimated as wheat from all American ports for 1884 and three years preceding were, by months and years, as below in bushels, allowing four and a half bushels to a barrel of flour.

	1884.	1883.	1882.	1881.
January ...	8,864,386	11,214,983	8,915,157	11,592,874
February...	6,808,511	9,727,883	7,687,428	10,145,202
March	7,242,876	9,805,474	8,534,585	14,680,652
April	9,392,155	7,110,523	6,971,948	13,580,167
May	7,745,191	5,636,784	7,217,656	12,904,013
June.........	7,146,871	6,254,120	6,421,221	12,763,667
July	9,194,892	6,425,799	12,570,229	11,618,246
August......	15,609,225	12,690,128	23,863,614	17,072,696
September.	12,932,343	11,305,765	20,853,888	13,122,662
October.....	11,046,067	10,058,515	12,808,304	8,850,438
November.	10,857,808	10,902,528	11,708,584	11,884,887
December..	12,862,001	9,268,889	12,861,854	10,208,957
Total.....	119,702,326	110,401,391	140,414,468	148,424,461

Experience has shown that in Minneapolis, the world's milling centre, the average consumption of flour *per capita* yearly is 1½ barrels. It is probable that the average of the United States as a whole is from ¾ to 1 barrel.

Roller mills produce from four to ten grades of food materials, according to the machinery employed and the trade supplied. These may, however, be condensed as below, to illustrate conveniently the percentage of the various grades resulting from a certain amount of wheat :

Patent flour.........................	18 125	per cent.
Clear flour..................	47.125	"
Low grade flour.....................	7.250	"
Feed..	24.6	"
Invisible loss..........................	2.9	"

The amount of wheat used in making a barrel of flour varies from 4½ to 5½ bushels, the former quantity being generally regarded as an ideal in good milling.

FLOWER, William Henry, an English zoölogist, was born at Stratford-on-Avon, Nov. 30, 1831. He was educated at University College, London, and at the Middlesex Hospital, graduating at London University in 1851. In 1854 he was admitted to the Royal College of Surgeons, and served with distinction in the Crimean war. In 1857 he became a fellow of the Royal College of Surgeons, and lecturer on comparative anatomy in the Middlesex Hospital. In 1858 he married a sister of Prof. Piazzi Smyth; in 1861 he was made curator of the Hunterian Museum. He also took Mr. Huxley's Hunterian professorship in 1869, and in 1879 he became president of the Zoölogical Society. He is the author of a very great number of scientific papers and of several volumes, chiefly on mammals.

FLOYD, John Buchanan (1805–1863), an American statesman, was born in Montgomery co., Va., in 1805, being the son of Gov. John Floyd. He graduated at South Carolina College in 1826, and was admitted to the bar in 1828. He practised law at Helena, Ark., from 1836 to 1839, then returned to Virginia, and was member of the State legislature in 1847 and 1849. He was governor of Virginia from 1850 to 1853. He was secretary of war during President Buchanan's administration, and when the secession of the Southern States was imminent, he took advantage of his position to scatter the small national army, and to transfer arms and munitions in large quantities to the Southern arsenals. In December, 1860, he was indicted by the grand-jury of the District of Columbia as being privy to the abstraction of a large amount of Indian bonds from the Department of the Interior, but he left Washington without being brought to trial. On the secession of Virginia he was made a brigadier-general in the Confederate army, and commanded in West Virginia. He was defeated by Gen. J. D. Cox and driven out by Gen. W. S. Rosecrans in the fall of 1861, and afterwards was transferred to Kentucky. He commanded Fort Donelson during its siege, but on Feb. 16, 1862, he abdicated the command and with Gen. Pillow and 3000 men of the garrison escaped to Tennessee. For his abandonment of the fort he was censured by the Confederate Government, and afterwards held only nominal commands. He died at Abingdon, Va., Aug. 26, 1863.

FLUSHING, an incorporated village of Queens co., New York, is on Flushing Bay, on the north side of Long Island, 8 miles E. of New York, on the North Shore division of the Long Island Railroad. It has a town-hall, 2 banks, 2 hotels, 2 daily and 2 weekly newspapers, 8 churches, a high school and other schools and academies. It has also an iron-foundry, planing-mills, dye-factory, tool-works. It is a handsome town, rising gently from the bay, has well paved, flagged and macadamized streets, a park, gas, and water-works. Its property is valued at $3,500,000, and the public debt is $237,000. It was settled in 1643 by English Quakers, but these were soon joined by Dutch and French immigrants. The name is derived from Flushing (Vlissingen) in Holland. Long noted for its nurseries and gardens as well as its educational advantages, it is a favorite residence of New York merchants. Population 6683.

FOND DU LAC, a city of Wisconsin, county-seat of the county of the same name, is 60 miles N. by W. of Milwaukee, at the S. end of Winnebago Lake, at the entrance of Fox River. It is on the Chicago and Northwestern, the Chicago, Milwaukee, and St. Paul, and four other railroads. It has communication also by steamboat with towns on the Fox, Wolf, and Wisconsin Rivers. Among its principal buildings are a fine court-house, opera-house, and high school. It has 6 hotels, 4 banks (one national), 2 daily and 5 weekly newspapers, 12 churches, 13 schools, 2 convents, and a monastery. Its manufactures comprise threshing-machines, farm implements, wagons, furniture, shoes, doors, sashes, etc. It is lighted with gas and electricity and has water-works and many astesian wells. Its property is valued at $4,000,000 and the public debt is $130,000. It was settled in 1836 and incorporated in 1851. Its population in 1880 was 13,094; one-half being of American birth.

FOOTE, Andrew Hull (1806–1863), an American admiral, was born at New Haven, Conn., Sept. 12, 1806. He was the son of Gov. Samuel A. Foote (1780–1846), and entered the navy as midshipman Dec. 4, 1822. He became lieutenant in May, 1830, and in 1833 was flag lieutenant of the Mediterranean squadron. In 1838, in the sloop-of-war John Adams, he circumnavigated the globe, and took part in an attack on the pirates of Sumatra. As superintendent of the naval asylum, 1841–43, and in the cruise of the Cumberland, 1843–45, he enforced total abstinence from intoxicating liquors. He also gave religious instruction and preached extemporaneously. From 1849 to 1852, in command of the brig Perry, he was engaged on the coast of Africa in suppressing the slave-trade. In 1856 while in command of the sloop Portsmouth he arrived at Canton just before the outbreak of hostilities between the English and the Chinese, and exerted himself to protect American property. While thus engaged he was fired upon by Chinese forts, and when an apology for this action was refused he attacked and captured the four forts, built of granite, and garrisoned with 5000 men. Out of his own force of 280 men he lost 40, while the garrison had 400 killed and wounded. At the outbreak of the civil war he was executive officer of the Brooklyn navy-yard. In July he was made captain, and in September was appointed flag officer of the flotilla intended to open the navigation of the Mississippi and its tributaries. With seven gunboats which had been built under his direction he sailed from Cairo, Ill., on Feb. 4, 1862. He first attacked Fort Henry on the Tennessee River on the 6th, and compelled it to surrender. On the 14th he attacked Fort Donelson on the Cumberland River, but after an action of an hour and a half was obliged to withdraw, two of his gunboats having become unmanageable. He himself was severely wounded in the ankle, but without waiting for proper treatment of the injury he sailed down the Mississippi, where he besieged and captured Island No. 10, which had been strongly fortified by the Confederates. He was then compelled to ask for leave of absence, and from the condition of his wound nearly lost his life. On June 16, 1862, he was promoted to be rear-admiral, and soon after was made chief of the bureau of equipment and recruiting. On June 4, 1863, he was ordered to take command of the South Atlantic squadron, but on his way was taken ill at New York, and died there June 26, 1863. He published *Africa and the American Flag* (1854), and *Letters from Japan.* See *Life of Admiral A. H. Foote* by J. M. Hoppin (1874).

FOOTE, Henry Stuart (1800–1880), an American statesman, was born in Fauquier co., Va., Sept. 20, 1800. He graduated at Washington College, Lexington, Va., in 1819, studied law, and was admitted to the bar in 1822. He soon after removed to Tuscumbia, Ala., where he edited a Democratic paper, and in 1826 he settled at Jackson, Miss. He took an active part in politics, and in 1847 he was elected to the United States Senate, where he was made chairman of the committee on foreign relations. He was a firm supporter of Clay's compromise, and in 1851 he was elected governor of Mississippi over Jefferson Davis, who had announced and advocated the policy of secession on account of the admission of California as a free State. In 1854 Foote removed to California, but he returned to Mississippi in 1858. He was still an adherent of the Union cause, and in the Southern Convention at Knoxville, Tenn., in 1859, spoke warmly in opposition to the policy of the Southern leaders. During the civil war he was a member of the Confederate Congress from Tennessee, and was noted for his hostility to Jefferson Davis' administration. He was engaged in several duels, in two of which he was slightly wounded. He died May 19, 1880. He published *Texas and the Texans* (1841); *The War of the Rebellion* (1866); *Bench and Bar of the South and South-west* (1876).

FOOTE, William Henry (1794–1869), an American clergyman, was born at Colchester, Conn., Dec. 20, 1794. He graduated at Yale College in 1816, and taught at Winchester, Va. After studying theology at Princeton, he was licensed to preach by the Presbytery of Winchester, and he became agent of the Central Board of Missions. Afterwards he was agent for Hampden-Sidney College, and during the civil war he was chaplain in the Confederate army. He died at Romney, Va., Nov. 28, 1869. His *Sketches of the Presbyterian Church in North Carolina* (1846), and in *Virginia* (two vols., 1850–55), are valuable contributions to the history of those States. After his death his work on *The Huguenots* appeared.

FOOT-WASHING, an ecclesiastical ceremony, founded on the act of our Saviour, described in John xiii. 4–14. It does not seem that our Lord's injunction in ver. 14, "Ye ought to wash one another's feet," contains any warrant for an ecclesiastical ceremony, but is an oriental method of enjoining humble helpfulness among believers. However, in Augustine's day (A. D. 400), the custom appears in the church, and through the ages since both popes and monarchs have used the Thursday of holy week (Maundy-Thursday: Maundy=*Mandatum*, John xiii. 34) for the washing of the feet of twelve poor persons. The custom is found not only in the Roman Church but among the Moravians and Dunkers. By all these the reciprocal character of our Lord's injunction is overlooked.

FORAGE CROPS. The grains or cereal grasses have been treated under Cereals, Vol. II., and more fully in the article Agriculture, Vol. I. There is another class of grasses less directly useful, but still no less important to man, for by their herbage they supply the food and nourishment of those animals that supply him with meat and raiment. These may be termed *agricultural grasses*, to distinguish them from the cereals and other groups of economic importance. They may be briefly characterized as comprising those kinds which furnish the food of the grass-eating animals of the farm, or those which may be cultivated for this purpose. As thus defined this group includes a large number of species which may be separated into (1) meadow or mowing grasses and (2) pasture grasses. The first division includes those cultivated for hay; the second, the kinds best adapted for pasturage or grazing.

The pasture grasses of this country, with a few exceptions in the older-settled portions, are wild or native species, that grow spontaneously without care or culture. Upon the vast grazing lands of the region beyond the Mississippi these wild species alone support 30,000,000 head of horned cattle and sheep. The so-called "artificial grasses," embracing the different kinds of clovers, etc., form a very considerable portion of the hay crop of the country, and are generally associated by the farmer with the true grasses. They belong to a very different class of plants, however, and will be treated separately.

Mention has been made of the fact that the cereals are frequently cultivated for winter pasturage, or are grown for hay. The first is a common practice in the South, while their use for hay is chiefly confined to California.

There are but few kinds of grasses which are actually cultivated for hay; and of those species which supply the great grazing interests of the country the average farmer knows little or nothing. The importance of an acquaintance with these may be inferred from the fact that in point of value they exceed many times that of the hay crop, which is estimated to be above $400,000,000. The number of kinds growing in the meadows and pastures of an ordinary farm is much larger than is generally supposed. To be able to distinguish these various kinds requires no great amount of study. It is an easy matter to learn the terms applied to the different parts of a grass sufficient to enable the farmer to distinguish those that are likely to come within the range of his observation, and, possessing this knowledge, he will soon discover the relative merits of each.

According to their habit of growth grasses may be classified as—1. *Bunch grasses*, or such as grow in bunches and do not form a sward. The "bunch grass" of the Rocky Mountain region and the common hair or hassock grass of the Eastern States are examples of this class. 2. *Gregarious grasses*, or such as grow crowded together, forming a compact turf or sward. This is the usual habit of the grasses of the temperate regions.

A further classification based upon the *place* of growth may be made, and we have, *a. Aquatic grasses*, those growing in the water, *e. g.*, wild rice (*Zizania aquatica*); *b. Salt grasses*, those growing only in alkaline soil or on salt marshes near the coast, *e. g.*, rush salt grass (*Spartina juncea*); *c. Meadow and pasture* grasses, embracing the greater number of the valuable species of the meadow and pastures; *d. Agrarian grasses*, or those possessing the character of weeds.

Useful as the grasses are in general, there are a few species among them which can only be looked upon as weeds—not in the sense merely of "plants out of place," but weeds wherever and under whatever conditions they may be found. Hedgehog or burgrass (*Cenchrus tribuloides*) is a species of this character. In the same category belong chess (*Bromus secalinus*), and bearded darnel (*Lolium temulentum*), both frequent grasses in grain-fields. The seeds of the last named are believed to be poisonous, a character almost exceptional in the grass family. Bearded darnel is supposed to be the "tares" of the New Testament.

There are other grasses which are weeds only when "out of place," or when occupying land designed for the use of other plants. Couch grass at the North and Bermuda grass in the South are species which become weeds of the very worst character when growing among cultivated crops. Barn-yard grass (*Panicum crus-galli*) and crab grass (*Panicum sanguinale*) are considered worthless weeds at the North, while at the South they are prized both for hay and pasturage. There are other kinds that make excellent forage while young, but as they mature they become weeds of a dangerous nature by the development of sharp-pointed awns, which may seriously injure horses or other animals feeding upon them. Wild oat grass (*Avena fatua*) and porcupine grass (*Stipa spartea*) are species of this character.

In a territory so large as that embraced within the limits of the United States, covering 25 degrees of latitude and 60 of longitude, with a climate that is subarctic at one extreme and nearly tropical at the other, with a surface diversified by the greatest lakes and longest rivers in the world, by endless plains, numerous and lofty mountain ranges, and great deserts, the vegetation must needs be of a most varied character. This variety maintains in the grasses, 800 species and varieties being known to grow within our limits.

In considering the *agricultural grasses* which abound throughout this vast area, they may be arranged into four groups: first, those belonging to the Northern and Middle States east of the Mississippi; second, those of the Southern States, ranging westward to Texas; third, those of the great plains and Rocky Mountain region; and, fourth, those of California. A list of the more common species, or those having recognized or probable value for forage, that grow in each of these districts, will be given. It will be observed that many of the species named are common to the whole region. Some of these are natives; but the larger part are introduced species, or those which have been brought from foreign countries, either intentionally or by accident. Certain species seem to follow in the footsteps of civilized man, and wherever he makes his abode there they may be found.

Northern and Middle States East of the Mississippi.—The country embraced in this district seems to be especially fitted for the growth of the grasses. The summers never have that protracted season of excessive heat and drought that is so fatal to the growth of the more valued kinds at the South, but the moderate temperature and usually abundant moisture keep the grasses fresh and green throughout the season. This region has long been the home of timothy and herds-grass, Kentucky blue-grass and orchard grass—varieties most highly prized for hay and pasturage. The number of native species is large, and in time some of these will doubtless dispute the claims of the now more favored European grasses.

The order in which the species are taken up is that of their botanical classification:

Paspalum.—Two species may be mentioned, smooth paspalum (*P. lœve*), frequent in moist meadows from New England southward, and setaceous paspalum (*P. setaceum*), having nearly the same range but found chiefly on sandy soil. They have not been sufficiently recognized to receive popular names, but their high nutritive value, that of the first named being equal to orchard grass, together with their general prevalence, entitle them to notice.

Panicum.—The genus *Panicum* is the largest among the genera of grasses. The species are chiefly tropical or subtropical. A number of kinds extend within the limits of this list and are included under the general name of panic grass. They possess little agricultural value. Barnyard grass (*Panicum crus-galli*) and old witch grass (*P. capillare*) are common everywhere in cultivated grounds and waste places, and are classed with the weeds.

Bristly Foxtail Grass (*Setaria*).—There are four or five species of Setaria, all introduced grasses and all weeds, excepting Setaria Italica, which, with its varieties, includes the Italian, German, and American millets. The true millet is a species of *Panicum.*

Fresh-water Cord Grass (*Spartina cynosuroides*).—Near the sea-shore and along the margins of lakes and rivers the fresh-water cord grass is quite common. It is not deemed of any agricultural value, but is mentioned here on account of its having been used with success in the manufacture of paper. Another species of *Spartina*, called salt reed grass, has a more robust habit than the last and is confined in its growth to salt or brackish marshes within tide-water. Rush salt grass (*Spartina juncea*) is common on salt marshes, forming a considerable bulk of the salt meadow hay of the coast. Salt marsh grass (*Spartina stricta*) is a very common species along the sea-coast. Cattle are very fond of it. It has a strong, rancid odor which is communicated to the milk, and even to the flesh of the animals that feed upon it. Salt marsh grass makes an excellent material for thatching, more durable than wheat straw. On account of this use of the grass it is sometimes called "thatch."

Indian Rice, Water Oats (*Zizania aquatica*).—This is a very tall reed-like grass, common in muddy or swampy borders of streams and rivers, growing frequently in shallow water. Extensive areas bordering the shores of the Delaware, below Philadelphia, are covered with this grass. (See Cereals.)

Rice Cut Grass, Rice's Cousin (*Leersia oryzoides*).—This and white grass (*L. virginica*) are common in very wet meadows and along streams. They are late bloomers and may have some value for late summer feed in localities where they abound.

Meadow Foxtail (*Alopecurus pratensis*).—This is an introduced species of much agricultural value. The floating foxtail (*A. geniculatus*) is an allied native species, frequent in wet meadows. Although prized both for hay and pasturage in England, they are not so much esteemed in this country. The meadow foxtail has a striking resemblance to timothy (*Phleum pratense*), but is distinguished by certain botanical characters as well as by its preference to wet meadows and earlier blooming. It is an excellent grass for permanent pastures and is valuable as a mixture in lawns.

Reed Canary Grass (*Phalaris arundinacea*).—This is a widely distributed native species, growing on alluvial soils by the sides of rivers, lakes, etc. It yields a large bulk of coarse hay, little liked by cattle or other stock. Canary grass (*Phalaris canariensis*) is an introduced species, rather frequent in waste grounds, and is sometimes cultivated for the seed, which is the favorite food of canary birds.

Sweet Vernal Grass (*Authoxanthum odoratum*).—A native of Europe, but naturalized here in meadows, pastures, etc. It is of no value for hay, but it is hardy and its early growth renders it desirable as a lawn or pasture grass when mixed with other varieties.

Wild or Native Millet (*Milium effusum*).—A perennial, rather slender grass, common to the northern portions of Europe and America. It grows naturally in cold, damp woods and on mountain meadows, but thrives well when transplanted to open and exposed situations. It yields largely and multiplies both by seed and by the roots, sending out horizontal shoots of considerable length, which root at the joints as they grow.

Drop-seed Grass (*Muhlenbergia*).—Seven species of *Muhlenbergia* are found within the limits embraced in this list. They all come into foliage and bloom in the latter part of summer, and are, perhaps, of some value in supplying forage in pastures and woods at a season when the herbage of more valuable grasses is withered or dead. In the western districts they occur in greater abundance than at the east, and not unfrequently form a considerable bulk of what is called wild or prairie hay.

Timothy (*Phleum pratense*).—Introduced from Europe and cultivated throughout the region as the most valuable of all grasses for hay. In New England it is very generally known as herds-grass, but this name had best be restricted to a species of *Agrostis* mentioned below.

Sporobolus is a genus including a number of species, more or less common, but none of sufficient recognized importance to have received familiar names. *Sporobolus heterolepis*, a valued grass on the western prairies, is found as far east as New York.

Herds-Grass (*Agrostis alba*). [See Plate XXV.]—This is a variable grass and has received a number of common names. In the Middle States it is called herds-grass, while in New England it is named "red top." *Agrostis vulgaris* is not regarded as a distinct species, it being united with *Agrostis alba*. This grass is a native of Europe and was probably introduced into cultivation from that country. It appears, however, to be a native along our northern borders. It is a valuable grass for moist meadows and pastures, and is very generally cultivated. There are several native species of this genus, one of which, hair grass (*Agrostis scabra*), often becomes a troublesome weed in cultivated fields.

Wood Reed Grass (genus *Cinna*).—A frequent grass in swamps and along the borders of moist thickets, where it affords some forage.

Blue Joint Grass (*Deyeuxia canadensis*). [See Plate XXIV., where it bears the name *Calamagrostis canadensis*.]—This is a common species in wet meadows, especially northward. It is one of the most highly valued of the native grasses. It yields a large amount of forage, and cattle are fond of it both in its green state and when made into hay. There are several other species of *Deyeuxia* found in this district, but none to compare with blue joint in point of value. The name "blue joint" is popularly applied to several other grasses.

Sea Sand Reed (*Ammophila arundinacea*).—Common on the sandy shores of the Atlantic coast and borders of the great lakes. It has no strictly agricultural value, but it serves an important purpose in protecting sandy beaches from the encroachments of the sea by binding together the loose sands with its strong, perennial roots, which often extend to the distance of twenty feet or more.

Common Hair Grass (*Deschampsia flexuosa*).—A common grass in dry, sandy soil and on rocky hill-sides. It has no value for hay, but sheep are very fond of feeding upon the short, radical tuft of leaves. It deserves notice as a pasture grass where the soil is light and sandy.

Velvet Grass (*Holcus lanatus*).—A native of Europe, naturalized here in moist meadows. Although easy of cultivation and quite productive, it is of little value either for hay or pasture. It has some claims as an ornamental grass, its attractive appearance having brought it into notice wherever it abounds. It has received many common names besides the one given above. In New England it is known as "Salem grass" and "white timothy;" in the South, "velvet lawn grass" and "velvet mesquit grass;" in England, "woolly soft grass" and "Yorkshire white." Meadow soft grass is another familiar name applied to it.

Wild Oat Grass (*Danthonia spicata*), also called "white-top" and "old fog."—This is a native and is common in dry fields and open pastures. Its presence in meadow lands is a sure indication of an impoverished soil. It makes a light yield, and its only recommendation is in the fact that it will grow on hard clay soils where little else will.

Mesquite Grass (*Bouteloua oligostachya*). [See Plate XXIV.]—This and two other species (*Bouteloua hirsuta* and *Bouteloua racemosa*) are found within the district covered by this list, but with the exception of *Bouteloua racemosa* are confined to the western borders. They are native grasses growing in dry, sandy soil.

Dog's-tail, or Wire Grass (*Eleusine indica*).—This is an introduced grass, common in the Middle States, growing in paths and in moist cultivated grounds about dwellings. It comes into full vigor late in the season, and is one of the latest flowering species, continuing to bloom until killed by the frosts.

Common Reed (*Phragmites communis*).—This grass is common to both the old and the new world. It is one of the largest of the grasses native to the United States, often growing to the height of twelve feet or more. It is only found in swamps or along the marshy borders of streams and lakes, and can scarcely be said to have any agricultural value although cattle will feed upon it while the plants are young and tender. In Great Britain it is used for thatch, and it may be utilized for the same purpose in this country.

Spike Grass, Salt Grass (*Distichlis maritima*), is common in the salt marshes along the coast, and in the alkaline districts of the Far West. It enters largely into the composition of marsh hay, but is deemed of little value.

Orchard Grass (*Dactylis glomerata*).—This is one of the very best grasses grown either for grazing or hay. It easily adapts itself to a variety of soils and climates, and in consequence has become widely distributed. It grows well in moderate shade, as in orchards, and its name (orchard grass) is probably due to this fact. Although a native of Europe, its first cultivation was in this country about the middle of the last century. Unless sown thickly or with a good mixture of other grasses, orchard grass will grow in clumps or tussocks, which is its natural habit and only objectionable character. [See Plate XXV.]

Kentucky Blue-grass (*Poa pratensis*). [See Plate XXV.]—The best known, and, at present, the most valued of the *Poas* is the Kentucky blue-grass, a native species, growing in meadows and along streams and rivers from Maine to Oregon and northward to Alaska. It is highly valued for hay, but it excels chiefly as a pasture grass. In the rich calcareous soils of Kentucky this grass appears to have attained to its greatest perfection: for this reason, probably, it has become generally known as Kentucky blue-grass. "June grass" and "green-grass" are names also applied to this species.

Rough Meadow Grass (*Poa trivialis*).—This is an introduced species of *Poa*, but has become very common in moist meadows. For such localities it is a valuable addition to the pasture grasses.

Wire Grass (*Poa compressa*).—A common grass in Europe, and probably introduced from that country along with the more valuable cultivated varieties. It is believed to be indigenous northward. The stems are flattened, and, unlike those of most grasses, are solid, and consequently it makes a hay very heavy in proportion to its bulk. It affects dry, sterile soils, and is regarded as a valuable pasture grass, since most grazing animals, especially sheep, are very fond of it. In color it has a decidedly bluish cast, and the name "blue-grass" is far more applicable to this species than to *Poa pratensis*.

Fowl Meadow Grass, False Red-top (*Poa serotina*). [See Plate XXIV.]—Common to Europe and America, growing naturally in moist meadows and along the low borders of streams. It is especially suited to the cool climate of New England and northern portion of New York, and its cultivation is chiefly confined to that region. As long ago as 1749 Jared Elliott published an account of this grass, claiming that it was much superior to timothy (*Phleum*), making a more soft and more pliable hay, and, in consequence, better suited for pressing and shipping. It thrives best when mixed with other grasses, and deserves a place in all mixtures for rich, moist pastures. The name "fowl meadow" is also applied to *Glyceria nervata*, a grass very similar to the above.

The genus *Poa* is represented in all parts of the world by many species, growing in woodland, pasture, or meadow, and, almost without exception, they make valuable forage plants wherever they abound. There are thirteen species found in the district embraced by this list: the most common is the little annual *Poa*, or low "spear grass," found in cultivated and waste grounds everywhere.

Manna Grass (*Glyceria*).—Ten species are natives of this district, and all are aquatic or semi-aquatic in their habits. The native hay from moist meadows is often largely composed of one or more of these grasses. One species, *Glyceria distans*, popularly known as sea or marsh spear grass is one of the most valuable kinds of the salt marshes along the coast. *Glyceria canadensis* has received the common name of rattlesnake grass, probably from the resemblance of the rather large spikelets to that snake's rattle. It is rather an ornamental grass, and is sought for winter bouquets. *G. fluitans*, *Floating glyceria*, or true "manna grass," is common in very wet, low grounds, usually growing in the water. The seeds have a sweetish taste, and are used by the poorer peasantry of some European countries for food. Reed meadow grass is a robust-growing species and yields a large bulk of hay. Nerved manna grass, *G. nervata*, sometimes called fowl meadow grass, is the most common species, and is, perhaps, the most valuable of all from an agricultural point of view.

Fescue Grass (*Festuca*).—Four native and two introduced species, the most valuable of which is the taller, or meadow fescue (*Festuca elatior*). [See Plate XXIII.] Common in rich pasture lands, meadows, and by the waysides. In Virginia it is called Randall grass. It is a hardy, perennial species, thriving equally well in dry and moist grounds. It deserves more attention than has been given it, especially as a permanent pasture grass. Sheep's fescue (*F. ovina*) is a low, densely tufted variety, and is valued in sheep pastures.

Brome Grass (*Bromus*).—Within the present district there are two native and six introduced species having little or no agricultural value; some of them are even troublesome weeds, as chess or cheat (*Bromus secalinus*) and upright chess or smooth brome grass (*Bromus racemosus*), both common in grain-fields.

Ray or Rye Grass (*Lolium perenne*). [See Plate XXV.]—This is a common grass in fields and by the wayside. It is sometimes cultivated here with other grasses, but it has received more attention and is more highly esteemed in Europe, from whence it was introduced, than it has in this country. Ray grass has a historical interest from the fact that it is the grass first mentioned as having been cultivated for agricultural purposes. As early as 1677 it was sown for the purpose of improving "cold, sour, clayey, weeping ground, unfit for saint-foin."

Couch Grass (*Agropyrum repens*).—This has been referred to under agrarian grasses. Although valued by some for hay its place in permanent meadows had better be occupied by species of really more worth, and its introduction among hoed crops is greatly to be dreaded, as it soon becomes a great pest exceedingly difficult to eradicate.

Wild Barley Grass (*Hordeum*).—There are two native species—one, wild field barley (*Hordeum pratense*), common on the prairies from Ohio westward, and the other abundant on the salt meadows along the coast and borders of the great lakes. The last is called squirrel-tail grass (*H. jubatum*). It is an ornamental species, and its seeds are sold by the florists.

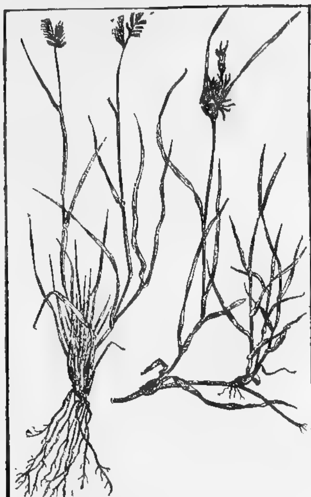
Wild Rye, Lyme Grass (*Elymus*).—There are five native species found within the limits of this list, the most valuable of which is probably the Canadian wild rye (*E. canadensis*). It grows in rich alluvial soil along river banks, and yields a large bulk of hay. *E. virginicus* and *E. striatus* are smaller species, growing in similar situations.

GRASSES OF THE SOUTH.—In the Southern States there is a more marked diversity in the soils and climate than appears in the New England and Middle States, and consequently there is a more decided difference in the character of the plants which the various sections afford. In the upper districts and in the mountains of Georgia and the Carolinas many of the grasses of the higher latitudes abound, and some of the long-established cultivated varieties of Europe and the Northern States are successfully cultivated; but the sub-tropical character of the climate of the lowlands near the seaboard and along the Gulf coast is incompatible with their growth. To meet the demands of this portion of the country selections must be made from the more promising species native to the soil, or the cultivator must look to the introduction of valuable varieties from regions farther south. Johnson grass (*Sorghum halepense*) and Bermuda grass (*Cynodon dactylon*) [see both on Plate XXV.], two of the most highly valued grasses at the South, either for hay or pasturage, are examples of such introduced species. Cattle may be left to graze throughout the mild winter season, so that there is less demand for meadow grasses than in more northern latitudes. Permanent pasture grasses are the species most desired—such as will withstand the excessive heat and drought of summer. As has been stated, the cereals, especially barley, are largely grown for winter pasturage. Tall oat grass (*Arrhenatherun*) [see Plate XXV.] is highly prized and cultivated in some sections for winter forage, and standing next in value to this is orchard grass. Where timothy and herds-grass can be grown they are cultivated for hay.

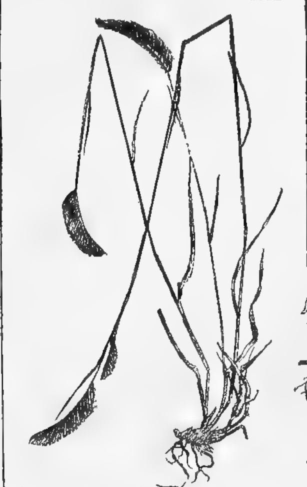
Florida abounds in native grasses, some of which have the appearance of possessing much agricultural merit, and would probably prove valuable in that State if cultivated.

GRASSES.

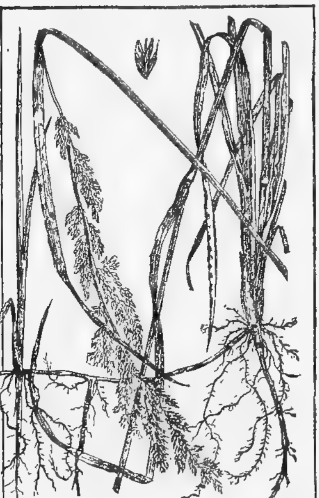
PLATE XXIV.



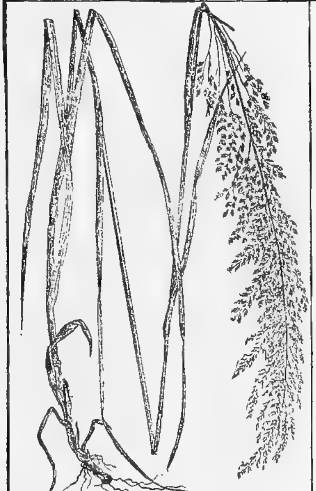
Buchloe Dactyloides



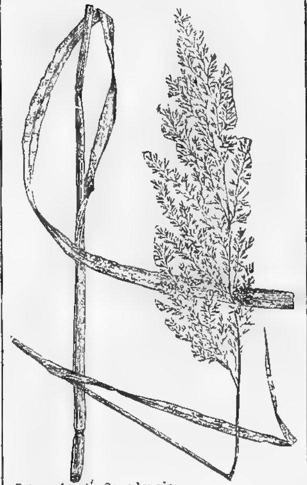
Bouteloua Oligostachya



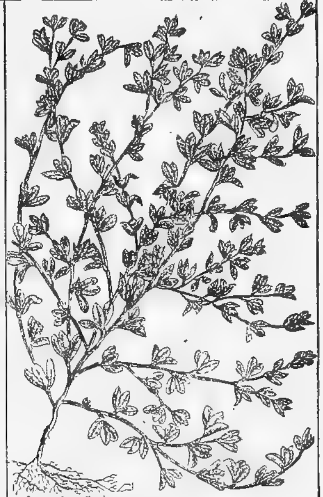
Poa Arachnifera



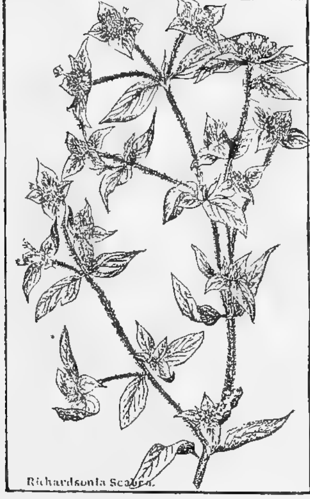
Poa Serotina



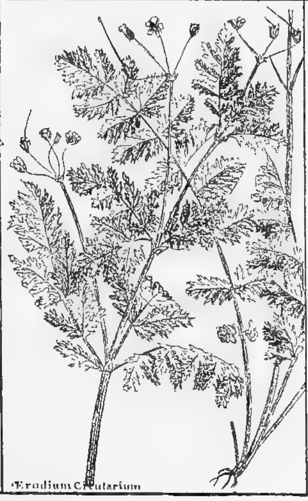
Calamagrostis Canadensis



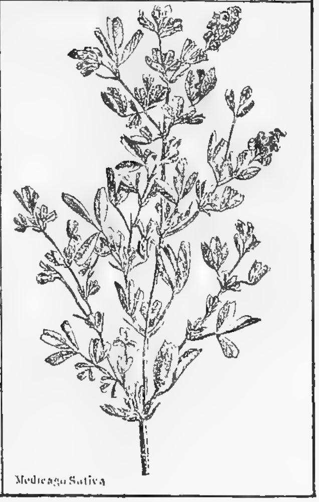
Lespedeza Striata



Richardsonia Scabra.

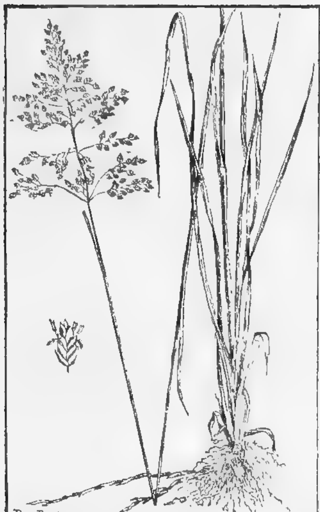


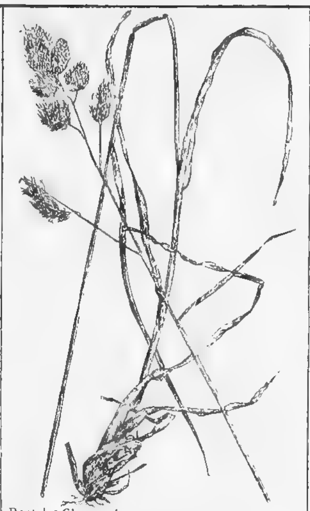
Erodium Cicutarium

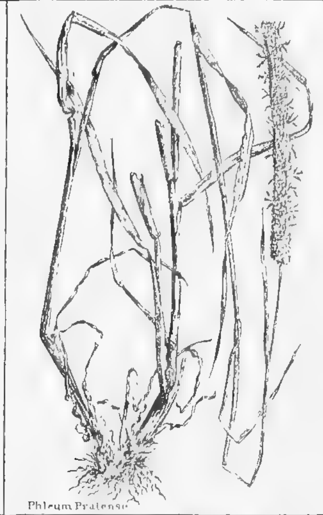


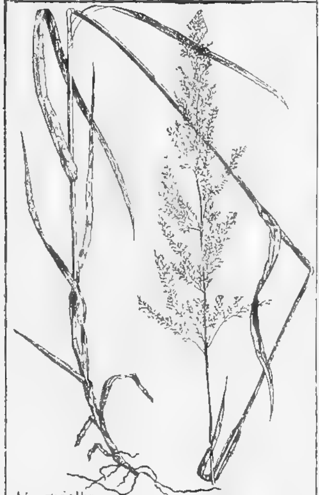
Medicago Sativa

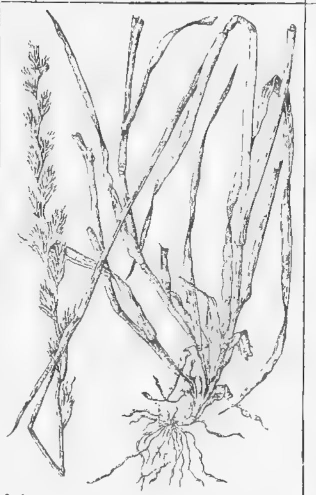
GRASSES. PLATE XXV.

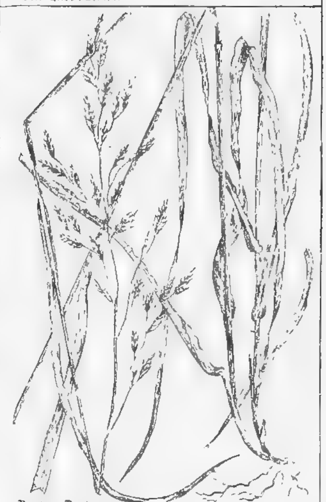

Poa Pratensis

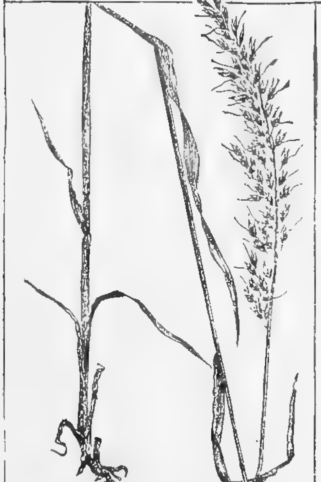

Dactylis Glomerata

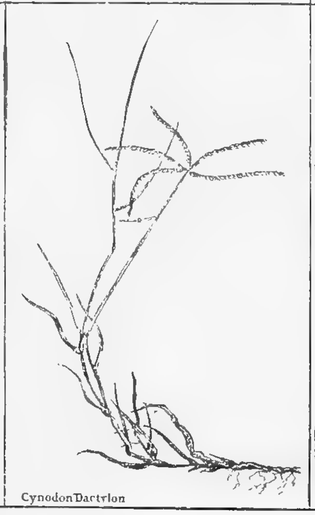

Phleum Pratense

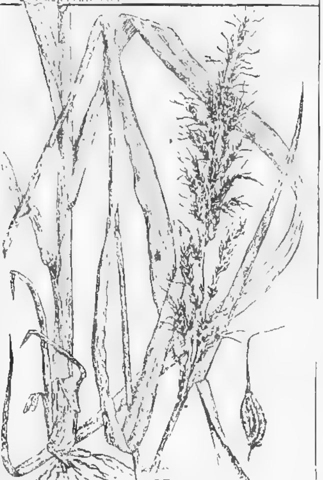

Agrostis alba


Lolium Perenne


Festuca Pratensis


Arrhenatherum Avenaceum


Cynodon Dactylon


Sorghum Halepense

The grass flora of Texas is wonderfully rich in its variety and extent—well shown by the fact that 12,000,000 head of cattle (including horses and sheep) feed upon the native grasses alone. Among these Texan grasses the agriculturists at the South can hardly fail to find valuable species that will be to them all that could be desired.

There are about 250 species of this family found growing spontaneously in the Southern and Gulf States, of which about 125 extend beyond their limits northward. Those which have been more or less recognized in agriculture are named below :

Paspalum.—Nearly twenty varieties or species of *Paspalum* are found in the South. With one or two exceptions they are all perennials, and, where abundant, are valued both for permanent pasture and for hay. Some of the species yield a large amount of tender and nutritious herbage, which is relished by all kinds of stock. *Paspalum dilatatum* is found in Texas, growing on dry lands, and is there commended in the highest terms, as furnishing excellent green feed for stock at all seasons. *Paspalum distichum*, a low-growing species, with something of the habit of Bermuda grass, though usually growing where the soil is more moist, makes excellent forage, of which cattle are very fond. It is known in some localities as "joint grass."

Panicum.—The Panic grasses are very abundant in the Southern States, and represent a large number of species, of great diversity of habit, growing in every variety of soil. Crab grass (*Panicum sanguinale*) and Barnyard grass (*Panicum crus-galli*), both introduced species, are the two most widely known, and, by some, the most highly valued. The first is abundant in all cultivated lands, and is regarded as one of the best grasses at the South for hay; the second, frequenting damp, rich soils, is of a much larger and coarser growth, but is very highly esteemed for pasturage during the latter part of summer. *Panicum virgatum* is a tall-growing species, common on sandy soil, where there is moisture, and yields a large amount of nutritious forage if cut while young. Texan millet (*Panicum texanum*) is a tender and nutritious grass, of luxuriant and rapid growth, producing an abundant yield of hay or forage. It has been introduced into cultivation.

Guinea Grass (*Panicum maximum*) is an introduced grass from the tropics, but thrives well along the Gulf coast, especially near the sea-shore and on sandy lands, where other good grasses do not succeed. It is a coarse grass, but sweet and nutritious, and all kinds of cattle eat it with avidity. A gentleman who has cultivated "Guinea grass" in Florida states, that "with this grass I believe Florida, with its mild and pleasant climate, might be made one of the finest grazing States in the Union." In Jamaica, large districts that were barren and regarded as utterly worthless previous to the introduction of this grass, have become the most profitable parts of the island, supporting vast herds of cattle. It is a perennial, and is best propagated by root cuttings.

Fox-tail Grass (*Setaria glauca*) is common in cultivated grounds, and is regarded of some value. At the North this is classed with the weeds.

Spartina.—There are four native species, which grow either in sandy, saline swamps, or salt marshes along the coast. They yield an abundant supply of green pasturage in spring and summer.

Hard Grass (*Stenotaphrum*) is an evergreen grass of low habit, confined to the damp, sandy soils of the coast, from South Carolina southward, and supplies excellent winter-pasturage.

Gama Grass (*Tripsacum*) grows in rich, damp, clayey soil, frequent in some portions of the South, and formerly cultivated as a forage or soiling plant. It is very tall and rank in habit, and may be cut five or six times a year, under favorable circumstances. All kinds of stock are fond of it, both as green or dry fodder.

Teosinte, or Guatemala Grass (*Euchlæna luxurians*), is a tropical grass related to maize or Indian corn, that has been introduced into this country within the past few years, and promises to be the most valuable of all grasses in the South for soiling or ensilage. It "tillers" out largely, and a single seed sends up many leafy stalks to the height of twelve or fifteen feet. "Undoubtedly there is not a more prolific forage-plant known. Cattle delight in it in a fresh state; also when dry." It is estimated that a hundred tons might be produced from a single acre upon land that is best adapted to it.

Wild Rice (*Zizania aquatica*) is common in marshes and along the margins of ponds and rivers, in shallow water, from Florida northward. It is a tall, coarse grass, often growing to the height of ten feet, and has elongated, rice-like seeds, which were the *"folle avoine"* of the early French settlers of the Mississippi Valley. There is another species (*Z. miliacea*), of similar range and habits. Both may be, and are, utilized for hay in especially dry seasons. "An acre of wild rice is about equal in nutriment to an acre of wheat."

Rice Cut-Grass (*Leersia oryzoides*), also called "false rice," "rice's cousin," and "white grass," has already been mentioned.

Broom Sedge (*Andropogon*).—There are a number of species of Andropogon found at the South, including *A. furcatus A. scoparius*, etc., but all are here regarded as worthless.

Indian Grass (*Chrysopogon nutans*) is common in dry, sandy fields, but has little value.

Johnson Grass (*Sorghum halepense*) [see plate], also known as "Means' grass," "Cuba grass," "Egyptian grass," "green valley grass," and "Guinea grass," is an introduced species, largely cultivated, and valued most highly, both for forage and hay. It is a perennial, of rapid and luxuriant growth, and is less affected by summer drought than other species. The name "Guinea grass," sometimes applied to this plant, belongs to a species of Panicum (*P. maximum, Jacq.*, which is the same as *P. jumentorum, Pers.*)

Reed Canary Grass (*Phalaris arundinacea*) is frequent in marshy lands and along the borders of lakes and streams. American Canary Grass (*Phalaris intermedia*) is a more strictly Southern species, although extending westward to the Pacific coast. Where it abounds, it is much esteemed for winter and spring grazing and for hay. A variety of this, of larger growth and closely resembling timothy in appearance, is still more highly valued by those who have experimented with it.

Sweet Vernal Grass (*Anthoxanthum odoratum*) is widely introduced, and similarly regarded as at the North.

Muhlenbergia.—There are a number of species of *Muhlenbergia* natives of the Southern States, but none of them have received any special attention. *M. diffusa*, called "wire grass" and "nimble Will," is perhaps the most valuable.

Timothy (*Phleum pratense*) grows spontaneously in some sections, and is cultivated for hay, as at the North.

Smut Grass (*Sporobolus indicus*).—This is the only one, among the several species of this genus which occur, that has attracted particular notice as a forage grass. It grows chiefly in waste grounds, and about dwellings where the soil is rich and undisturbed. If allowed to mature, it becomes tough and wiry, but if kept grazed down, it makes excellent forage throughout the summer season. *Sporobolus vaginæflorus* grows on sandy, barren soil, and is valuable as affording food for cattle where little else will grow.

Herds-Grass and White-top are varieties not now regarded botanically distinct, being both referred to *Agrostis alba.* They grow spontaneously in many parts of the country where the soil is sufficiently moist, and are esteemed for hay and pasturage. Southern bent grass (*Agrostis elata*) is taller and in every way more robust than herds-grass, growing abundantly in sandy swamps.

Velvet Grass (*Holcus lanatus*) is found in low ground as far south as North Carolina.

Tall Meadow Oat Grass (*Arrhenatherum avenaceum*) has been introduced naturally, and by cultivation, into several of the Southern States. It thrives well in a great variety of soils. Where it has been cultivated in the upper districts, it takes precedence over all other grasses for winter pasturage. It also makes a large yield of excellent hay.

Bermuda Grass (*Cynodon dactylon*).—This grass grows in all warm and temperate regions of the world, and has become thoroughly naturalized throughout the Southern States; probably introduced there from Bermuda, as the name suggests. It is one of the most valued grasses for permanent pastures, especially in the sandy regions along the borders of the Gulf coast, and it is one of the most troublesome of weeds when established upon lands designed for other crops.

Wire Grass, Yard Grass, or Dutch Grass (*Eleusine indica*).—This grass, supposed to have been introduced from India, is very common about gardens, and in rich soil near dwellings. It is nutritious, and by some is considered excellent for soiling, grazing, or for hay. Crowfoot Grass (*Eleusine ægyptiaca*) is a species allied to the last, growing in similar situations. By many it has been more highly esteemed for hay, for which purpose it has occasionally been cultivated.

Common Reed (*Phragmites communis*) is found in deep river marshes near the coast, from Florida northward.

Broad-Leaved Spike Grass (*Uniola latifolia*).—There are four native species of *Uniola*, but only the one here mentioned is considered of any agricultural merit. It grows in large tufts along the borders of streams as far north as Pennsylvania. Sea Oats (*Uniola paniculata*), growing in drifting sands along the coast, is ornamental, and is gathered for winter bouquets.

Perennial Rye Grass (*Lolium perenne*).—This and Italian rye grass, both valuable for pasturage or hay, are cultivated to some extent in the upper districts.

Wild Rye Grass (*Elymus*).—The species of *Elymus* are evergreen at the South, and are valued for winter grazing.

Cane (*Arundinaria*).—The large cane, which abounds in deep river swamps, forms a remarkable feature in the vegetation of the Southern States. Wide areas covered with this grass occur on the rich alluvial soil of the Santee swamp, forming thickets so dense as to be impenetrable by man or beast, and growing to the height of 20 to 30 feet, the stalks having a diameter of 2 inches or more at the base. A small variety of the above grows in swamps and low grounds. Both are evergreen, and grazing animals feed greedily upon the leaves in winter, and find protection from the driving rains and piercing winds under the dense roof of the canebrake or thicket.

Orchard Grass (*Dactylis*).—An introduced species already referred to.

Kentucky Blue-Grass (*Poa Pratensis*) is frequent in cultivated grounds. It is grown as a pasture grass, and is valued as a winter and spring grass at the South.

Manna Grass (*Glyceria*).—Several species that are common at the North come within the limits of this list. They have no recognized importance.

Fescue Grass (*Festuca*).—There are several species: Meadow (*Festuca elatior*) is cultivated as far south as the Carolinas. In Virginia it is locally called "Randall grass." It remains green throughout the winter months, and supplies excellent grazing throughout that season. Hard Fescue (*F. duriuscula, L.*), a variety of sheep's fescue, occurs as far south as Florida.

Brome Grass (*Bromus*) has one native and several introduced species. *Bromus unioloides*, called "rescue grass," has been cultivated in some sections, and grows spontaneously in the far South. It is a rapid grower, very tender and sweet, and is greedily eaten by cattle.

III. GRASSES OF THE GREAT PLAINS.—That vast area forming the eastern slope of the Rocky Mountains, embracing the States and Territories of Nebraska, Colorado, Kansas, Wyoming, Montana, the Indian Territory, and Eastern New Mexico, is the great grazing region of the country. Here abound in great variety the most nutritious native grasses, which yield ample forage to more than 20,000,000 head of cattle (including horses and sheep), besides supporting innumerable herds of buffalo and other wild grass-eating animals. The grazing resources of these "boundless, endless, gateless" pasture-lands are apparently unlimited. No labor is spent in the cultivation of these grasses, excepting that an occasional stream may be diverted from its course for the purpose of irrigation. During the rainy season, in May and June, vegetation grows luxuriantly; but when the rains cease, the grasses gradually dry on the ground, and before the winter season arrives they have become perfectly cured, uncut hay, as nutritious as the best of meadow hay. The principal varieties composing the herbage of these plains are "bunch grass" (including several species of *Poa*, *Festuca*, *Oryzopsis*, etc.), buffalo grass (*Buchloë*), grama grass, broom-sedge or prairie-grass, and mesquite. In some of the valleys blue-joint grass (*Calamagrostis*), native red-top, and wild-rye grass abound.

In the Rocky Mountain region, about the head waters of the Missouri, the most valuable grasses on the river bottoms and lower bench lands are *Poa tenuifolia*, *Kœleria cristata*, *Agropyrum glaucum*, *Bouteloua oligostachya*, and *Oryzopsis cuspidata;* on the upper benches and lower foothills these grasses gradually give way to *Agropyrum divergens* and the varieties of *Festuca ovina;* above these the "great bunch grass" of the Rocky Mountains (*Festuca scabrella*) becomes the prevailing and most important species.

The list given below includes the more important grasses found upon the plains. Mr. E. Hall, in the report of the U. S. Department of Agriculture for 1870, gives a more extended list, embracing 57 genera and 143 species, of which he states that 91 extend across the Missouri River, leaving 52 species belonging to the plains and mountain region proper. The relative value of the twelve most important species representing the great forage resources of the country is exhibited in the following table of percentum estimates, 100 representing the aggregate value of the twelve:

Name.	Missouri River Region.	Rocky Mountain Region.
Andropogon furcatus.....Broom sedge.........	40	16
Andropogon scoparius... " "	20	10
Chrysopogon nutans......Indian grass.........	20	12
Sporobolus heterolepis.........................	12	1
Buchloë dactyloides......Buffalo grass.........	5	5
Bouteloua oligostachya..Grama grass.........	0	10
Spartina cynosuroides...Fresh-water cord grass..............	2	2
Festuca ovina..............Sheep's fescue.......	0	20
Festuca microstachya	0	5
Bromus kalmii.......................................	0	8
Poa serotina..	0	8
Stipa viridula..	0	5

Barn-yard Grass (*Panicum crus-galli*) occurs in rich soils about settlements. Crab grass (*Panicum sanguinale*) is found in similar situations.

Beckmannia erucæformis is frequent on the borders of mountain ponds, etc. It is a valuable forage grass in such localities.

Fresh-water Cord Grass (*Spartina cynosuroides*) is common in wet lands, but is a very poor substitute for hay, for which it is sometimes cut. Another species (*Spartina gracilis*) is not uncommon in alkaline soils.

Wild Rice (*Zizania aquatica*) grows near lakes and muddy river bottoms, and is especially common in the Northwest.

Broom Sedge (*Andropogon furcatus*).—This, with an allied species, *Andropogon scoparius*, grows in great abundance in the eastern portions of the district, and with Indian grass (*Chrysopogon nutans*) constitutes three-fourths of the grazing resources of that portion of the country. The first named is one of the principal hay grasses of the country, and is largely cut and cured for winter use. All three, however, enter into the composition of prairie hay, which is considered best when cut just before killing frosts, in early autumn.

Feather Grass (*Stipa*).—Several species occur, but only one (*S. viridula*) that has any value. In favorable localities this grows to the height of from four to six feet, and it furnishes a considerable amount of valuable grazing in the mountain districts.

Reed Canary Grass (*Phalaris arundinacea*) is common in wet situations.

Oryzopsis cuspidata is a handsome grass, growing in bunches on the sandy plains. It is one of the several kinds called "bunch grass," and is highly valued for grazing.

Muhlenbergia.—Five species are common on the plains or along mountain streams. *Muhlenbergia pungens* is perhaps the most valuable as a forage plant. In Arizona, where it is abundant, it is known as black grama, or grama China. *Muhlenbergia gracilis* is also an important species in grazing districts.

Sporobolus airoides is frequent in mountain valleys, growing chiefly in alkaline soils. When green it is readily eaten by stock.

Sporobolus heterolepis flourishes chiefly in the moister portions of the plains, and many local areas are almost exclusively occupied by it. It is especially liked by cattle, and in Kansas, where it abounds, it affords a rich winter-pasturage. It is sometimes cut for hay in the absence of more productive species, and makes an article of first quality. (Hall.)

False Red-top (*Agrostis exarata*).—A good pasture grass, frequent along mountain streams, etc.

Blue Joint Grass (*Deyeuxia canadensis*) is common in moist prairie land. It makes a very large yield in rich soil, and great quantities are cut for hay. *Deyeuxia stricta* and *sylvatica* are two other species of smaller habit, that supply more or less forage on the mountains.

Bouteloua oligostachya. [See Plate XXIV.]—A perennial grass, very common on the mountains and adjacent plains. Although too low in habit and too much scattered in its growth to be cut for hay, it is one of the most valuable species for grazing purposes, and much of the beef of the South-west is the product of this grass. It is commonly known as "grama grass," a name, however, that is applied, not only to other species of *Bouteloua*, but to grasses of other genera. In some places this grass is called meskit, or mesquite, which is another name that has been applied t several different species of grass, and, again, it is called buffalo grass.

Bouteloua hirsuta, a species closely resembling *B. oligostachya*, is valued for forage on the plains, where it is common, preferring sterile or sandy soil. *B. racemosa*, frequent in many localities on the plains and mountains, is a handsome and well-marked species, but of less value than the others for forage.

Buffalo Grass (*Buchloë dactyloides*). [See Plate XXIV.]—This is abundant on the central plains from Texas to the British possessions. This is a grass of low growth, rarely more than four or five inches in height, but it extends rapidly by means of its creeping stolons, and covers with a dense turf large areas, and affords rich and nutritious forage throughout the year, its stolons remaining green during the months of winter. In Texas it is called "mesquite."

Common Reed (*Phragmites communis*) occurs on the borders of lakes, etc.

Kœleria cristata is a perennial grass, very common on dry hills or sandy prairies, and forms a valuable addition to the forage of the drier regions, where it most abounds. In some localities this is called June grass.

Salt Grass (*Distichlis maritima*).—This is abundant on the alkaline meadows. It is but slightly nutritious, and when encrusted, as it often is, with the surrounding alkaline matter, it is positively injurious. Its stout creeping roots form a most compact sod, which is very difficult to break up with the plow.

Poa tenuifolia is one of the so-called "bunch grasses," and furnishes abundant and valuable forage in the mountain districts. It is usually associated with *Kœleria cristata*. *Poa nemoralis* is common on the higher as well as on the low mountain ranges. This, with *Poa pratensis*, which is indigenous to the mountain districts, affords valuable food for all kinds of stock. Several other species of *Poa* occur, but these here mentioned are the most important.

Nerved Manna Grass (*Glyceria nervata*) in swamps and wet lands, and *Glyceria pauciflora* by high mountain springs and brooks, make excellent forage where they abound, and are eaten by cattle with avidity.

Festuca scabrella is one of the largest and most valuable of the "bunch grasses" of the Rocky Mountains, cattle being very fond of it, especially in winter.

Sheep's fescue, in several varieties, is plentiful in the mountain regions and adjacent plains. It is a nutritious grass and contributes largely to the general forage crop of the country.

Festuca microstachya is a valuable annual species abundant in dry soil on the mountains and higher plains on the southern portion of the district. This is one of the so-called "grama grasses."

Bromus kalmii is confined chiefly to the mountain region. Although the species of this genus (*Bromus*) are usually regarded as worthless, Mr. Hall states that, where plentiful, *Bromus kalmii* affords excellent pasturage.

Couch Grass (*Agropyrum repens*) is truly indigenous in the Rocky Mountain region, presenting many forms. It is valued for forage, and is known to the herdsmen as blue-joint, bunch grass, and lagoon grass. One of the varieties is especially valued for hay in Montana.

Hordeum jubatum and *nodosum* are both common on the plains in moist land, and when young make tender and nutritious forage; but when allowed to mature they become a great nuisance, for when associated with other grasses the value of these for hay is entirely destroyed. The long and sharp-pointed beards stick fast in the nose or mouth of horses feeding upon them, often penetrating the flesh, sometimes causing death.

Wild Rye (*Elymus canadensis*) is a valuable grass frequent on the plains and mountains in moist localities; and *Elymus condensatus*, the more common species, makes valuable winter grazing for cattle.

THE GRASSES OF CALIFORNIA.—California, with an agricultural area exceeding that of Great Britain and Ireland, has done very little in the way of cultivating the agricultural grasses; in fact, the climate of that State is such as to preclude any system of grass-culture for meadows and pastures where artificial or natural irrigation cannot be maintained throughout the season. From about the 1st of May until the 1st of November no rains fall, and none of the grasses cultivated in the Eastern States can withstand so protracted a season of drought.

Almost the only grasses employed for hay are the cereals. These are cut before the grain has ripened, and the "wheat hay" and "barley hay," with oats similarly cured, constitute the mass of the hay crop. Where permanent pasturage is wanted, and where it is possible to secure and maintain this by irrigation, alfalfa (*Medicago sativa*), an "artificial grass," is employed almost exclusively. Kentucky blue-grass is used for lawns, but its verdure is only maintained at great labor and cost. In Oregon this grass, so highly prized in the East, is regarded as one of the most troublesome weeds in cultivated fields, its rapid propagation by means of root-stocks and stolons making it very difficult to eradicate.

Rye Grass (*Lolium*) is sufficiently abundant in some localities to be cut for "volunteer hay." This grass remains green all summer, without irrigation, in the bay climate, and at some points it is regularly cultivated as a meadow grass. In the higher valleys, that can be irrigated from mountain springs, there is an occasional field of timothy. Orchard grass has been introduced, and this, with soft meadow grass (*Holcus lanatus*), is found in the tule lands and in other naturally or artificially watered regions, and has come into some use for pasture as well as hay. Several species of sorghum and other large grasses have been introduced, and their culture is increasing. Especially is this true of Pearl millet (*Penicillaria spicata*). In winter and early spring the hills and plains are green with species of crane's bill (*Erodium cicutarium* [see Plate XXIV.] and *E. moschatum*). The first named is esteemed as one of the most important natural pasture plants, being about the only green thing available to stock throughout the dry season, and it is eagerly cropped by animals at all times. It is called by the Spanish "Alfilerilla." "Bur-clover" (*Medicago denticulata*) is another "artificial grass," which flourishes under difficulties that would discourage most other plants from attempting a growth, and forms a valuable ingredient of the dry pastures.

Wild Oat (*Avena fatua*) was formerly very abundant in the hills and valleys throughout the State, but it has been much reduced in extent by the depredations of sheep. In early times it was most highly prized for hay, and it is still employed for this purpose.

Herds-Grass, or Red Top (*Agrostis alba*), has been introduced in most of the cultivated portions of the State.

Sweet Vernal Grass is another introduced species; and so is the Tall Meadow Oat Grass, which has become naturalized as a weed.

Bermuda Grass (*Cynodon*) is found native in the southern part of the State.

The natural grasses of the State contribute but an insignificant portion towards the maintenance of the flocks and herds. On the open "ranges" cattle scour large areas, browsing upon every green thing which is not too repellant. To the eye of the herdsman from the East these grazing grounds appear to be little more than barren wastes, where cattle could only be left to starve; but they supply food and that sufficiently nourishing to bring the stock into fine condition. Between the wet and the dry season there is no gradual transition; but the change is sudden, and the grass and other herbage is cured *in situ* into a most nutritious hay.

The native grasses of California having more or less agricultural value are enumerated below:

Beckmannia erucæformis forms the greater part of the herbage of the wet meadows in the northern part of the State.

Salt Marsh Grass (*Spartina stricta*) is common on the salt marshes along the coast.

Feather Grass (*Stipa setigera*) is a tufted grass, common on the dry hills and plains throughout the State. It is tender and nutritious in April and May. Another species (*Stipa speciosa*) grows in scattered bunches over the Mojave desert, and, with other species, furnishes an "occasional bite, palatable though tough to chew, to antelopes and to strolling cattle and sheep." It is a handsome grass, and would make a valuable addition to the ornamental species.

Hilaria rigida is a "striking species on account of its rigid, woody stems, in habit resembling some of the dwarf bamboos." It grows in the dry, sandy districts in the southern part of the State. Although it is tough and hard, mules eat it with avidity.

Reed Canary Grass (*Phalaris arundinacea*).—This and the more common *Phalaris intermedia* occur in wet grounds and along river banks. They are of little agricultural value. The first named is a very common plant in similar situations in the Eastern States. *Phalaris amethystina* is another

Californian species, less common than the two above named, but is tenderer and more palatable than either of them.

Hierochloa macrophylloa is found in damp woods, and yields a small amount of tender herbage.

Silky "Bunch Grass" (*Oryzopsis cuspidata*) is a handsome grass, growing in tufts or bunches with *Stipa speciosa*, on the Mojave desert, and extending eastward from the Sierras.

Sporobolus airoides is scattered over the Mojave desert with *Stipa speciosa*, and, like that grass, yields a bite here and there to roving animals.

Blue-joint Grass (*Deyeuxia canadensis*) is common, especially in the Sierra Nevada Mountains, growing in moist places and producing a large amount of nutritious forage.

Deyeuxia æquivalvis is a tender and sweet grass, growing on the verge of mountain brooks.

Deyeuxia Aleutica is a coarse grass, growing in dense tufts. When sufficiently abundant it makes a valuable pasture grass, animals eating it with avidity. There are two other species of *Deyeuxia* that may be mentioned—*D. Bolanderi*, scattered through damp forests along with *Hierochloa macrophylla* and *Deyeuxia rubescens*, a "hard grass growing in thin, rare tufts, on pine-barren plains, where there is nothing else for deer to feed upon."

Deschampsia calycina is often so abundant in moist meadows as to constitute a large proportion of the herbage. It is a tender grass, and is eaten with avidity by animals. *Deschampsia holciformis* is a more robust species, growing in similar situations.

Mesquite, or Gramma Grass (*Bouteloua oligostachya*), referred to under GRASSES OF THE PLAINS, is rare in California.

Common Reed (*Phragmites communis*) grows in wet places along the margins of rivers, etc.

Golden Lamarkia (*Lamarkia aurea*) is a very pretty ornamental grass, found in the Colorado Desert.

Melica imperfecta is frequent on the hill-sides and in meadows. It makes tender and valuable forage in April and May.

Pleuropogon californica grows in valleys and moist meadows. Animals are very fond of it; and, according to Mr. Bolander, it is almost the only certainly indigenous grass deserving the attention of the agriculturist.

Poa tenuifolia is one of the most valuable of the "bunch grasses," and is frequent throughout the State.

Couch Grass (*Agropyrum repens*) is found in various parts of the State, and is valued for forage.

Squirrel Tail Grass (*Hordeum jubatum*), one of the earliest grasses, is common along roadsides and in waste grounds. While young it is much relished by cattle, but later, by the development of its barbed or awned flowers, it becomes a serious nuisance.

Elymus condensatus grows in small scattered patches or in clumps; and its leaves, though tough and hard, are stripped off by hungry cattle. Wild Rye Grass (*E. canadensis*), a more widely known and more valuable species, is found in moist low lands and along river borders.

"Throughout the mountains, where cattle cannot be herded so successfully, sheep are everywhere led by their herders, swarming like vermin and creeping up to the very pinnacles of rock to the snow-line, nibbling or trampling in the dust all vegetation. No grass, at ever so great an altitude, but must contribute its mite towards the sustenance of these flocks. Thus *Stipa stricta*, *Sporobolus depauperatus* and *gracillimus*, *Agrostis varians*, *Trisetum canescens*, *Melica stricta*, *Poa tenuifolia*, and *P. Pringlii* on bare mountain tops, or around mountain springs and rills, must all yield a dainty mouthful to the miserable, dust-begrimed sheep, compelled, in their ascent, to live on the foliage of shrubs and brittle herbs." (Pringle.)

ARIZONA AND SOUTHERN CALIFORNIA.—The soil and climate of Western New Mexico, Arizona, and Southern California are in many points unlike those of any other portion of the United States, and the peculiarities of the grass-flora are remarkable. The following sketch of the grasses of this region is from the pen of Mr. C. G. Pringle, a well-known botanist and collector, who has traversed this section of our country several times and carefully studied its vegetable productions.

In going into the South-west from New England, where all deforested areas are closely sodded with perennial grasses, one is struck with the insignificance of the permanent grasses there and the almost entire absence of sod.

In the bottom of the valleys and along the line of the water-courses (although water may not flow above the surface, except during the period of summer or winter rains), and in soil more or less impregnated with alkali, the traveller occasionally meets with natural meadows, chiefly formed by *Distichlis maritima*, its creeping roots forming a close net-work in the soil, and *Sporobolus wrightii*, growing in great clumps. The former has a wiry stem and its foliage is tough; but animals accustomed to subduing spiny opuntias and thorny shrubs thrive on it. The latter is rigid, coarse grass, its culms often four or five feet high and as thick as a goose-quill; when its stems are young animals browse away their upper portions, and cull out—from amongst the bristling stumps of the stems of former years, that remain standing dense and stiff and some two feet in height—the long radical leaves of the plant. To arrive after nightfall and a long forced drive to reach grass and water upon such a meadow, and be compelled to picket one's horses on its pastures, which have been closely grazed by the herds of ranches far and near, seems hard, but from May to August the valleys and plains furnish nothing better.

Sporobolus cryptandrus, var. *stricta*, scattered along the margins of streams, possesses much the habit of *S. wrightii*, and is of equal economic value. *Sporobolus asperifolius*, with a finer herbage than the last, occupies patches of wet soil, and its abundant and leafy sterile culms yield forage more easily appropriated by animals.

Panicum obtusum, growing in low lands, particularly in the partial shade of shrubs, contributes a trifle of forage, by its long, creeping, wiry, but leafy stems.

In low lands, scattered trifles of *Andropogon saccharoides* and *Trichloris fasciculata* contribute a little food to animals, as acceptable probably as any afforded by the perennial grasses. *Panicum leucophæum* and *Andropogon contortus*, growing in thin scattered tufts on the mesas and foot-hills, are of similar value. *Hilaria rigida* on sandy plains has hard stems and tough leaves, but animals are forced to consume it. *Panicum fuscum*, *verrucosum*, *capillare* var., and *colonum* are rather weeds of tilled fields, and as forage plants probably equal *Panicum crus-galli*, *P. sanguinale*, *Setaria viridis*, and *Setaria glauca*. With these may be classed *Helopus punctatus*, *Eragrostis purshii*, var. *diffusa*, *Chloris alba*, *Leptochloua mucronata*, grasses of tenderer substance that are eaten with avidity.

Agrostis verticillata, growing on the margins of water-courses, is a tender and nutritious morsel; so also are *Eatonia obtusata*, which, however, is less abundant in Arizona, *Agrostis exarata*, growing by brooks, and *Phalaris intermedia*, a species more widely scattered along streams and in wet cultivated soil.

To cattle straying over miles of arid wastes, nibbling at the leaves of thorny trees and shrubs, or pulling here and there a bitter weed, such grasses as *Setaria caudata*, *Tricuspis pulchella* and *mutica*, *Muhlenbergia debilis*, and even *Aristida americana*, and *A. humboldtiana*, *Bouteloua gracilis*, and other species, all scattered in thin tufts over hill and mesas, furnish dainty bits that are seized upon with avidity.

When the summer rains fall abundantly, these species renew their growth, or spring up from the seed, and grow so rapidly as to cover the soil with a pretty close growth of herbage, which furnishes abundant pasturage to fatten herds during the autumn months. Only a small part of this is consumed while green, but drying up in the droughts of October and November, and being little weather-beaten in that dry climate, it serves to sustain the herds through the winter and early spring months. The more densely covered areas are sometimes mown for hay.

Cottea makes its growth entirely during the summer rains. This and the two species of *Pappophorum* may be classed, in point of economic value, with the species of *Aristida* and *Bouteloua*, though apparently far less common than these.

Hilaria cenchroides, not rare on the hills, is a perennial, grows feebly, and fruits during the dry months from April to July, and contributes a little to save stock from starvation; so likewise does *Muhlenbergia pungens*. Both are wiry, but nutritious grasses. Under the summer rains they grow more luxuriantly, and the latter growing in bushy clumps, retains in its wiry stems much nutriment, so that it supplies the more common sort of hay in the towns and in the stop-stations, being pulled by the Mexicans or Indians, and brought in on the backs of donkeys or on carts, even as late as May, when it is gray with age hence "grama grass."

Poa annua, var. *stricta*, and *Festuca microstachya* furnish a few tender bits of food to cattle following up the mountain streams in the spring.

Beside streams of mountain cañons a species of *Imperata* furnishes tall leafy clumps that are eaten eagerly by animals at all seasons of the year.

On the higher slopes of the mountains, particularly on those turned away from the direct rays of the sun, and under the partial shade of pines and rocks, are found in May, *Atropis californica* and *Muhlenbergia virescens* growing in clumps, and standing so close together as to remind one of the northern meadows. The first named furnishes the tenderest and sweetest of pasturage; the last is a soft and leafy grass. These two species largely compose the "deer parks" of those mountains, but unfortunately their growth begins at such an altitude, some 6000 feet, that horses can seldom get the benefit of them.

In Arizona the coarse grass of the valleys is called "saccatone," a name applied to *Sporobolus wrightii* and similar species. There is another name in use among the Mexicans to distinguish the shorter, softer grasses of the mesas.

Works of Reference: Chapman, Dr. A. W.—*Flora of the Southern United States;* Flint, Chas. L.—*Grasses and Forage Plants*; Gould, John Stanton—*Grasses and their Culture* (1869); Gray, Dr. Asa—*Manual of Botany of the Northern United States;* Howard, C. W.—*Manual of the Cultivation of the Grasses and Forage Plants at the South;* Mohr, Dr. Chas.—*Grasses and Forage Plants of Alabama;* Phares, Dr. D. L.—*Farmer's Book of Grasses and other Forage Plants for the Southern United States* (1881); Scribner, F. Lamson—*Agricultural Grasses of Central Montana;* Thurber, Dr. Geo.—*S. Watson's Botany of California;* Vasey, Dr. Geo.—*Agricultural Grasses of the United States* (1884). (F. L. S.)

CLOVER, though not botanically classified among the grasses, is an important forage plant. It is represented chiefly by the genus *Trifolium*, though some species of allied genera, having similar leaves, get the popular name of clover applied to them. Thus the "bur clover" of California is *Medicago maculata*, and *M. lupulina* is "wolf clover." "Chili clover," also known as "alfalfa," is *Medicago sativa*. "Japan clover" is *Lespedeza striata*, and "Mexican clover" *Richardsonia scabra*. These are all shown on Plate XXIV. "Bokhara clover" is *Melilotus leucantha;* "Hart's clover," *M. officinalis*, which is also called "sweet clover;" and "prairie clover" is represented by various species of *Petalostemon*. The *Richardsonia*, however, has not leaves like the "trefoils," as the *Trifolium* family is commonly called. It is a plant of the Rubiaceous family, a native of Mexico, which has become naturalized near Mobile and other points in the Southern United States, and is found to do very well and to be acceptable to stock in places where genuine clover does not do well. The alfalfa is a famous plant for dry regions; even in places like those west of the Rocky Mountains and Utah it will afford two or three cuttings a year. The Bokhara clover is a famous bee-plant, as are indeed most of the trefoils; the white clover, *Trifolium repens*, and the Alsike clover, *Trifolium hybridum*, ranking also among the best for this purpose.

Of true trefoils, which comprise the genus *Trifolium*, there are about 200 species known, inhabiting the temperate regions of both the northern and southern hemispheres, some of them reaching to almost alpine heights. In the eastern parts of the United States there are only three truly indigenous species—*Trifolium carolinianum*, *T. stoloniferum*, and the "Buffalo clover," *T. reflexum*. The last named is strong enough in growth to make a field-crop; it does not seem to have been tested for agricultural purposes. West of the Mississippi the number of species increases, some forty having been described as indigenous between the Rocky Mountains and the Pacific coast. The European species are abundantly naturalized, the "red clover," *Trifolium pratense*, white or "Dutch" clover, *T. repens*, "hare's-foot" trefoil, *T. arvense*, and the "hop clover," *Trifolium procumbens*, being particularly abundant. In agriculture the red clover is the most popular, as yielding the heaviest amount of hay or forage; the white clover for permanent pastures, and the Alsike clover, *Trifolium hybridum*, where the ground may be either mown or pastured, and especially for cool climates. These are all perennials. In grassy places in Colorado, New Mexico, and Arizona an annual species, *Trifolium involucratum*, enters largely into the herbage. The Alsike clover is so named from the Swedish district where it was first found, and where, from the characters being intermediate between the red and white clovers, it was believed to be a hybrid. From this belief Linnæus gave it the name of *Trifolium hybridum*. Botanists, however, do not regard it as a real hybrid, chiefly perhaps from a prevalent belief that hybrids are sterile, which, however, is by no means always the case. Its exact native place is, however, not known. The seeds are much smaller than those of red clover, and are of a dark green tinged with yellow when ripe. In Sweden, where the seed is grown largely for exportation, the yield is about 135 pounds to the acre. Red clover is grown largely for the seed in the United States. The first crop rarely produces seed to any great extent. It was once thought that this was on account of the absence of humble-bees to fertilize the flowers, but it is now known that the bees visit the first crop of flowers as freely as the last, and that they have little part in the fertilization, as they bore into the corolla from the outside when gathering honey, and thus avoid the stamens. The pollen-gathering insects may aid fertilization. The second crop has lost some of its vegetative power, and this always assists reproduction. The seed is threshed by machines especially constructed for the work; about 1,500,000 bushels is the annual product of the United States. Western New York is a famous clover-seed district, some seasons producing as much as 30,000 bushels. The usual yield is from three to seven bushels per acre; one case is on record of a lot of 48 acres in Western New York yielding 315 bushels, which were sold for $2200. In France and England, where sheep-husbandry prevails, the scarlet or French clover, *Trifolium incarnatum*, is often grown, because it makes, with turnips, a very early herbage for sheep to feed on, but it is grown only for ornament in the United States. Red clover is often used where manure is scarce, to be ploughed down as a fertilizer. When a crop of about two tons to the acre is so used, it is believed to be equal to five cords of stable-manure. The Japan clover is believed to have been in some unknown way introduced from Japan about the middle of the present century. Its growth is small, but its advantages are that it will thrive on the poorest ground where other clovers will not, and cattle thrive very well on it. The bur clover, *Medicago maculata*, has become naturalized, and thrives wonderfully well in California and contiguous States. Cattle are very fond of it, but the seed-vessels are bur-like, and give the wool-raisers great annoyance. It seems to have spread in California from early times. The Indians are very fond of the seed. They also use the plant, which is gathered and placed between hot stones, first moistened, and sometimes a small quantity of a kind of onion is added. The Apaches used the plant boiled as greens.

Many other forage plants allied to the clovers might be enumerated. The White Lupine is of extreme value both as fodder and as a plant to be ploughed under in the green state for its fertilizing effects. Its culture is chiefly confined to the south of Europe. Vetches and Tares are highly prized in Europe for pasture plants. They are of the genera *Vicia* and *Orobus*. They have by no means received in the United States the attention they deserve. The Vetchlings are of the genus *Lathyrus*, and in some European places are highly valued. The same is true of the "Bird's-foot trefoils," small Old-World herbs, very nearly allied to the true clovers. They are of the genus *Lotus*. The Sainfoin (*Onobrychis sativa*), though adapted only to a very small range of soils, proves of high value in dry, chalky places in the south of England. (T. M.)

FORBES, Archibald, a British journalist, was born in Morayshire, Scotland, in 1838, being the son of a clergyman. After studying at the University of Aberdeen he enlisted in the Royal Dragoons, and served for some years. Then becoming connected with the London press, he was sent in 1870 to France as correspondent of the *Daily News.* In the same capacity he has visited India, Turkey, Cyprus, South Africa, and America. His practical knowledge of military affairs and his indomitable courage and perseverance have made him one of the ablest war-correspondents. Among his publications in book form are *Drawn from Life*, a novel; *My Experiences of the War between France and Germany; Soldiering and Scribbling;* and *Life of Chinese Gordon.*

FORBES, John Murray (1807–1885), an American Episcopal clergyman, was born in New York, May 5, 1807. He graduated at Columbia College in 1827, and at the General Theological Seminary of the P. E. Church in 1830. In 1834 he became rector of St. Luke's Church, New York, and was also for a time professor of pastoral theology in the General Theological Seminary. In 1849, influenced by the tractarian movement, he entered the Roman Catholic Church, and was soon after made pastor of St. Ann's R. C. Church, New York city. In 1852 he attended the plenary council of the Roman Catholic Church at Baltimore, as the theologian of Bishop Reynolds, of Charleston. In 1854 he was theologian to Bishop J. B. Fitzpatrick, of Boston, in the provincial council held at New York. In 1859 he withdrew from the Roman Catholic Church, and in 1862 he was restored to the exercise of his ministry in the Protestant Episcopal Church. From 1869 to 1872 he was dean of the General Theological Seminary. He died at New York, 1885.

FORCE, Peter (1790–1868), an American antiquarian, was born at Passaic Falls, N. J., Nov. 26, 1790. His father was a revolutionary soldier, and in 1793 removed to New York city, where Peter became a printer. In 1815 he removed to Washington, and there published the *National Calendar*, an annual volume of statistics (1820–36). He also (from 1823 to 1830) published the *National Journal*, which supported the cause of John Quincy Adams, and during his presidency was the official journal of the administration. Having already devoted much time to the collection of documents illustrating American history, Force undertook by government authority the preparation of a documentary history of the American colonies. To this work he devoted thirty years, during which he published nine folio volumes called *American Archives.* A tenth volume was prepared, but remains unpublished. Force also gathered an immense and valuable collection of books, pamphlets, manuscripts, and maps relating to American history. From these he published four volumes of historical tracts. The entire collection was purchased by Congress in 1867 for $100,000. Mr. Force had also taken an active part in the affairs of the city of Washington, and from 1836 to 1840 was mayor of that city. He died at Washington, Jan. 23, 1868. Besides his historical works he published *Grinnell Land* (1852) and *Auroral Phenomena* (1856).

FORESTRY. The art of protecting, producing, and utilizing forest growth, though as a science almost unknown in America, has had for centuries a recognized place in Europe. It rose there to its present dignified position simply because it was found to be an essential element of national prosperity; and the time appears to be at hand when it will here be recognized as of great importance.

See Vol. IX. p. 349 Am. ed. (p. 397 Edin. ed.)

More than 600 years ago Philip III. of France laid down a crude code of laws for the protection of the forests in his domain; and Louis XIV. in 1669 reduced the management of his forests to a system more perfect than had hitherto been attained. France in July, 1827, modernized her forest system, adapting it to the needs of the time. The Saxon King Ini, about the end of the seventh century, was rigid, but just as the age allowed, in enforcing forest regulations among his subjects in England, carrying his supervision down to a forest which comprised but a few acres. William the Conqueror, however, was oppressive, cruel, and in the last degree regardless of private rights in government of the forests of England. It is to be observed that under this monarch the forests were chiefly valued as accessories of royal luxury and because they held and hid the king's game. It has been truly said that the unauthorized killing of a hare then was a more serious offence than the killing of a man. It was only when war turned the attention of princes from hunting to ship-building that the timber came to be valued for itself. It is interesting also to observe how the forests, which originally were no man's land, became, first, after law asserted itself, the king's, for the king's sport; second, the king's, for the use of the realm when that was apt to mean the king's ambition; and, third, the realm's, for the highest good of the people. These may be regarded as marking distinct steps in the history of England.

Sweden demands that for each tree cut down two shall be planted, and in 1878 the forests returned to the public treasury, over and above cost of care, $450,000. Even Finland has her School of Forestry, and, unexpected as it may be, Spain has produced 1126 books and pamphlets on the subject. In Germany forest schools are as much fostered by the government as the most renowned university of the empire. An eminent legal writer in France broadly and exactly states the problem of the relations of the government and the individual to the wooded portion of the domain. "The preservation of forests is one of the first interests of society, and consequently one of the first duties of government." "The forests are actually more requisite to the state than to the individual. As to woods and forests the public interests demand that individuals shall not be free to clear them from the soil whenever they please." England, though among the first to enact forest laws, has as yet no school of forestry. The result is that her most aspiring young estate managers go to France or Germany to seek the higher special culture they desire.

For our purposes we may divide the science into the following heads:

I. The Original Timber.
II. Present Condition of our Forests.
III. Destruction of Timber, and need of Legislation.
IV. Proper Native and Introduced Forest Trees for Planting.
V. Effect of Forests on Rainfall and in Protecting the Surface of the Earth.
VI. Forests as Affording Protection against Extremes of Temperature.

I. **The Original Timber.**—Taken as a whole, North America can hardly be regarded as densely wooded. The fact that the eastern coast from Maine to the Gulf was covered with timber, good in quality and abundant in quantity, and that this condition extended west beyond the Alleghenies and in some instances even beyond the Mississippi River, has been misleading; for in the State of Texas alone there are areas larger than Pennsylvania without trees, and one may cross from the Pacific to the Gulf encountering no forests large enough to be represented on the map. Major J. W. Powell, in his report upon the "Arid Region," thus states the relations between timber and those regions: "The Arid Region of the United States is more than four-tenths of the entire country, excluding Alaska" (p. 23). "The timber regions constitute from 20 to 25 per cent. of the Arid Region" (*l. c.*) In other words, to start with, in four-tenths of the United States we have what corresponds, nearly, to one-tenth of one entire area in timber. Of the remaining six-tenths it is safe to say, in the absence of exact statistics, that not more than three-tenths are covered with original timber. This with the one-tenth above given would make, as an approximate estimate, four-tenths of the United States in timber; but out of this area so much of the original, the best, timber has been culled that we should be safe in saying this is equivalent to the removal of another tenth, thus leaving three-tenths of the entire area in available first-class timber.

Before the first crops could be planted, it was requisite to remove and destroy the timber. This has induced almost a tree-destroying tendency among Americans.

It is also surprising how small a portion of North America produces good, strong, durable timber in considerable quantity, even in the timber regions. The best oaks, all the hickories, most of the maples, the locust-trees of sufficient size to be valuable as timber, as well as the large wild cherry-trees, the beeches and the large birches, along with the elms, stop before they reach the Rocky Mountains, and but few of them reappear on the Pacific slope. The one oak of the Rocky Mountains is a mere bush which attains no commercial size, and though California, Oregon, and Arizona have several species, they are of less value than those of the Atlantic side. But rich as the East is in cone-bearing trees, it is far behind the West in the size of its species. The gigantic representatives of the order are the chief glory of the Rocky Mountain and the Pacific regions. When the central parts of the continent are reached timber ceases to be found on the lower levels. Vast areas there are absolutely devoid of tree growth until an altitude of 4000, 5000, or even 8000 feet above the sea is reached. Then forests largely of coniferous growth continue until, on the parallel of 40° N. lat., an average altitude of 11,500 feet is reached where trees disappear, and all above is a naked alpine region where cold excludes all vegetation save the hardy herbs, or still hardier lichens or mosses. Following Drs. Gray and Hooker in their paper on the vegetation of the Rocky Mountain region, we may say of the oak family in the United States that it comprises "21 oaks, 2 chestnuts, and a beech, in the Atlantic flora; 9 oaks and a Castanopsis in the Pacific flora; and 2 or 3 others [oaks] between the Rocky Mountains and Mexico." The following quotation from the same authors fully expresses the relations of the Coniferæ or Cone-bearing trees:

> "*Taxineæ* are absent from the Rocky Mountain flora. The Atlantic flora has the depressed *Taxus Canadensis* at the north, and an upright arborescent and perhaps peculiar species in the northern part of Florida. There is a similar one in the woods of the Pacific side of the continent. The Atlantic flora possesses the original *Torreya;* California another; the two remaining species are of North-eastern Asia.
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> "*Cupressineæ.*—The amphigæan *Juniperus communis* traverses the continent at the north; and a prostrate form of *J. Sabina* probably does the same; also *J. Virginiana*, the eastern red cedar. But on a southern range the latter species hardly passes out of the Atlantic region. *J. occidentalis* and *J. Californica* are the characteristic species of the mountains bordering and traversing the southern part of the Great Basin and of California. *Cupressus* is wanting to the Atlantic and to the Rocky Mountain floras, but there are three species in the Pacific flora. *Chamæcyparis* is of one species in the Atlantic flora, two in the Pacific, the remainder in Japan. *Thuja* is of two species, one of the Atlantic flora, the other of the Pacific and of Japan. *Libocedrus* is represented by a peculiar species only in the Pacific flora.
>
> "*Taxodineæ.*—Of *Taxodium distichum*, in the Atlantic flora; *Sequoia gigantea* and *S. sempervirens*, the Big Trees and Redwoods, in California.
>
> "*Abietineæ* are more numerous in North America than elsewhere. Like the preceding, they prefer the sides to the centre of the continent, yet are not wanting to the mountains of the latter. *Pinus* is represented in the Atlantic flora by twelve species; in the Rocky Mountains and those of the Great Basin by six different species, not counting those of Arizona; in the Pacific flora by eleven species, four of which are in the preceding flora. *Larix* has a single Atlantic and two Pacific species, one or both of which occur in the Northern Rocky Mountains. *Picea*, the spruces, two in the Atlantic, two others in the Rocky Mountain, and two in the Pacific flora, one of the latter a Rocky Mountain species. *Tsuga*, one (hemlock spruce) in the Atlantic, and one almost the same in the Pacific flora, which has also the peculiar *T. Pattoniana* or *Williamsonii*. *Pseudotsuga Douglasii*, of the Pacific and Rocky Mountain flora, most abundant in Oregon. *Abies*, the firs or balsam firs, two in the Atlantic, two in the Rocky Mountain, and four or five in the Pacific flora, one of them common."

Or expressing the same thing with special reference to our subject, we may say there are on the Atlantic side 4 or 5 species of pine of greater or less commercial importance, 1 hemlock spruce, 1 larch or hackmatack, which does not extend South, an arbor-vitæ or Thuya likewise largest and commonest toward the North, a white cedar (*Cupressus*) which abounds in swamps from Massachusetts to Wisconsin, and along the coast to Florida, furnishing a light wood of great durability, and a bald cypress (*Taxodium*) commonest toward the South, where it becomes a large tree, and furnishes a lumber which year by year is becoming more popular in house-finishing.

The valuable trees of the Rocky Mountains are 1 or 2 pines; 1 fir (*Abies*); a hemlock (*Tsuga*); the so-called Oregon pine (*Pseudotsuga Douglasii*), which is of wide range and extreme importance to the wants of the West; and 1 or at most 2 cedars.

The trees of value to the Pacific region are, 1 yew; 2, or possibly 3, junipers; the so-called white cedar (*Libocedrus*), the 2 redwoods (*Sequoia*) or big trees, of which 1 is the largest, though not the tallest, known species of tree; 2 or 3 firs (*Abies*) belonging to a group of 7 species, of which 3 are 200 feet or more high; the *Pseudotsuga Douglasii*, which is the same as the "Oregon Pine" of the Rocky Mountain region; 2 hemlock spruces (*Tsuga*), which are both large trees; 1 genuine spruce (*Picea*) which reaches nearly 200 feet high, 3 or 4 (out of 8) pines of real importance to civilization; besides which there are 4 species of pine whose large edible nuts were of extreme value to the aborigines; and a Thuya or arbor-vitæ which grows 150 feet high, and ranges from Northern California to Sitka.

Then the East has a dozen or more species of oak which, in size, strength, and durability, meet the conditions of a vast range of utility, but the West has perhaps nothing equal among oaks to either the white or live-oak of the East. Maples give in the East 3 species, and in the West 1 species of value. Hickories belong exclusively to the East, and the locust also so far as size requisite for utility is concerned.

Value depends somewhat upon surroundings. Thus the cottonwoods (*Populus*), though of very little or no value in our well-timbered East, are of value in the desert areas of the West, where it is almost the only indigenous group of trees which fringes the banks of the streams in an otherwise treeless waste. To these the future population, scant though it may be, must look for its home supply of wood.

The object in enumerating so much in detail the locations and species of native trees is to furnish a sure foundation for any conclusion as to what the forestry of the future must rely upon. It will be seen that the range of choice is large enough to meet any future wants if the task of restoration be early and wisely undertaken.

The great danger lies in the fact (granting unusual rapidity of growth here) that men forget that from 30 years to a century is the time requisite for production of a tree crop, for as a crop requiring care trees must sooner or later be regarded.

II. PRESENT CONDITION OF OUR FORESTS.—The statements given above apply to areas and not to the quantity of timber on each surface. It is evident, however, that a division is possible here, into lands which are as yet practically in their original condition, and lands from which the original growth of *most* or at least the *best* of the timber has been taken. We might, so far as the Atlantic States are concerned, say that there has been, as we go from Maine to the Gulf, a constantly decreasing ratio of destruction in the timber. In some of the States a very large proportion of the best has already been taken, in others it is hardly sensibly diminished. Thus while along the shores of the Delaware and Chesapeake Bays the white oak has been very largely taken, in the mountains of Virginia and North Carolina, as well as in similar parts of adjacent States, it is still abundant, and of very superior quality. It should be added that the term quality is a variable one. Thus we may have timber actually of the very first class for one kind of work, and almost useless for another. To illustrate, it has been found by certain railroads that for ties whilst white oak from Ohio was good that from Pennsylvania was better, but that from Virginia was best of all, so far as durability was concerned. Timber taken from the island of the Grand Menan, in the Bay of Fundy, has for ship-building purposes about one-third more durability than that from the main land, but 10 miles to the west; and it is alleged that the best Susquehanna white-oak will rot vastly sooner than the same kind of wood from the Chesapeake shores of Maryland and Virginia. There is a rule which may be applied to discrimination between good and bad timber ordinarily. Thus, as between two specimens of the *same kind* of wood, that which has its medullary rays or silver grain the closer and which has the larger year's growth will be the stronger.

The following statistics have been collected under the direction of Prof. Sargent for the Census Office, and may be regarded as being the most reliable that can be obtained. The column headed "Standing Timber" means that which was standing in the respective States up to May 31, 1880, and the next column, headed "Cut Timber," shows what was cut during the year ending May 31, 1880. The fourth column gives the number of years it would require to exterminate the given species in each State at the rate of destruction indicated in the third column. The measure represents *board feet.*

State.	Kind of timber.	Standing timber.	Cut timber.	Duration.
Pennsylvania .	White pine (*Pinus Strobus*).	1,800,000,000	380,000,000	4.7
" .	Hemlock (*Tsuga Canadensis*).	4,500,000,000	300,000,000	15
Michigan, Lower penins.	White pine.	29,000,000,000	4,068,773,000	7.1
Upper penins.		6,000,000,000	328,438,000	18.2
Minnesota	"	6,100,000,000	540,997,000	11.2
Wisconsin	"	41,000,000,000	2,097,299,000	19.5
North Carolina .	Long-leaved pine (*Pinus Australis*).	5,229,000,000	108,411,000	48.2
South Carolina .	"	5,316,000,000	124,492,000	42.7
Florida .	"	6,515,000,000	208,054,000	31.7
Georgia	"	16,778,000,000	272,743,000	61 5
" .	Short-leaved pine (*Pinus mitis*).	....	28,335,000	
Mississippi .	Long-leaved pine.	17,200,000,000	118,000,000	159.1
" .	Short-leaved pine.	6,775,000,000	7,778,000	871.3
Louisiana .	Long-leaved pine.	26,588,000,000	61,882,000	429.6
" . . .	Short-leaved pine.	21,625,000,000	22,709,000	952 2
Texas	Long-leaved pine.	20,508,000,000	66,450,000	308.7
"	Short-leaved pine.	26,093,200,000	146,420,000	178.2
" . . .	Loblolly pine (*Pinus tæda*).	20,907,100,000	61,570,000	339 5
Alabama . . .	Long-leaved pine.	18,885,000,000	245,396,000	76.9
" . . .	Short-leaved pine.	2,307,000,000		
Arkansas . .	Short-leaved pine.	41,315,000,000	129,781,000	318.3
California . .	Redwood (*Sequoia sempervirens*).	25,825,000,000	186,635,000	138.3

Michigan has also very large bodies of hemlock, white cedar, yellow cedar, and tamarack.

Minnesota has, beside white, red, and burr oaks, suga maple, poplar, tamarack, cedar (*Thuya*), paper birch, and scrub pine (*Pinus Banksiana*).

Wisconsin has, beside considerable quantity of oak, tamarack, cedar (*Thuya*), fir spruces.

In North Carolina over large areas turpentine manufacture has caused a loss of 10 to 20 per cent. of the timber. The State has also considerable loblolly pine (*Pinus tæda*).

California has besides much valuable sugar pine and several inferior species of oaks.

The list of States is, as will be observed, by no means complete so far as such reliable data as the above go. Those given indicate that at present rates of decrease the average duration of these species for the whole area represented by those States mentioned would be 185.5 years.

III. DESTRUCTION OF TIMBER AND NEED OF LEGISLATION.—From the foregoing statistics it is evident that for the more Northern States the timbers which are most prized are in some States already nearly exhausted, and that in others they will be gone before a crop can be grown to take their place. But the Southern and South-western States appear as yet to have centuries ahead of them before this condition of affairs is reached. This, however, is only an apparent abundance, as will be clear when one remembers that, first, in addition to what we have hitherto removed from them the absolute coming dearth at the North must now be supplemented from the South; second, that building of new railways in the South will make new and heavy inroads upon the forests for ties, for building, and in coalless regions to a certain extent for fuel also; whilst at the same time it will afford new facilities for the removal of timber; third, that instead of the rate indicated marking the rapidity of timber disappearance, it will be a vastly greater and constantly increasing ratio to meet the wants of an increasing population. And further, that in opening new farms and settlements much of the timber, as hitherto, will be burned down to get rid of it instead of being made to serve some useful purpose. Hence with all these new factors we must conclude that the superabundance in the South indicates simply that with increasing dearth elsewhere and increasing facilities for reaching that section, all the tree-destroying agencies of the land will speedily be concentrated there and hasten, beyond what we can now think possible, the destruction of the forests. The above estimates give no clue to the disappearance in smaller ways of other valuable timber, for example the rock elm (*Ulmus racemosa*). The forests of Puget Sound are matchless in both the size and abundance of the timber they furnish, but the completion of one railroad after another will hasten their removal. Second natural growth will of course to a certain extent take the place of the timber removed, but thus far it has been precarious, or at least uncertain.

These facts and considerations prove that legislative action is needed, if not for the preservation of our forests, then at least for some protection against their reckless destruction. It is probably out of the question to prevent the individual owner doing as he will with what he has fully acquired by purchase; but it is evidently within the power of government to retain absolutely what forests it still holds, or to impose such conditions as may be deemed wisest when they are sold. Major Powell (*l. c.* p. 27) writes: "The timber lands cannot be acquired by any of the methods provided in the pre-emption, homestead, timber-culture, and desert land laws, from the fact that they are not agricultural lands. Climatic conditions make these methods inoperative. Under these laws 'dummy entries' are sometimes made. A man wishing to obtain the timber from a tract of land will make homestead or pre-emption entries by himself or through his employés without intending to complete the titles, being able thus to hold these lands for a time sufficient to strip them of their timber. The government still owns about 85,000,000 acres of forest land."

Among the most serious injuries to a country is the removal of timber recklessly in advance of the wants of a permanent settlement, because after the first rush of adventurers, who have come and gone, the final settler finds himself restricted at all points for want of that great requisite of civilization—lumber. Fires have become one of the most serious foes to our forests. The injury inflicted thus upon old and the number of young trees killed outright in some regions is simply incalculable. No penalty can be too severe for those who designedly start a fire through a wooded tract, and though legislation has already been had the penalty is entirely too light for the injury done. Prof. Sargent has estimated that in 1880 the country suffered a loss of $25,462,252 from forest fires.

Many States now place a reward upon trees planted. Especially in the Western States—Kansas, Nebraska, Iowa—is this done. It is fairly a question as to whether protection of trees already standing, whether of artificial or natural growth, is not entitled to more consideration than it has received. A thriving young tree saved from being cut down simply "to make a clearing" is as much a source of future good to the State as one planted. "If the individual is laboring to benefit the commonwealth by planting trees along the roadside and receives the State bonus in the form of lighter taxation, why should he not receive the same consideration when he allows his acres to go untilled in the interest of the State?" In other words why should forest land be taxed so long as it is unproductive to the individual but productive to the State? The legal bearings of this relation are worthy of consideration. A well-known U. S. Senator publicly stated that owing to the taxes on his white pine lands he was obliged to remove the timber. This means that such taxation is a premium placed upon the premature removal of one of the most important sources of future prosperity. Before leaving this part of the subject it may be allowable to anticipate and to say that inasmuch as trees act beneficially to the State by their mere presence and growth, it is not enough to meet the question of timber destruction by answering that with increasing facilities for transportation what lumber is required in the arts can be brought from where it abounds. This leaves a most important factor in the problem absolutely untouched. No area capable of producing trees should be without them in due proportion.

IV. Proper Native and Introduced Forest Trees for Planting.—Large as our list of available native trees is, it by no means follows that we might not with advantage introduce others from other countries. Southern Europe furnishes now a notable illustration of the value introduced trees may be to a land. Thus our common locust, introduced there about the year 1600, is now a large, widely diffused, and most useful tree. In some of the arts it has won a special place, being for example largely used in manufacture of spokes for wheels, and for other purposes where strength and elasticity are required. Any wood is better than no wood, hence the Ailanthus, box elder (*Negundo*), and Catalpa, which in the East are regarded as of so little value, become on the western plains of prime importance, as they are, along with the cottonwoods, if not the only trees which will flourish there, at least those which do best there. (The western form of Catalpa, as we shall see, has new and important uses assigned it.) In California, though the native tree flora is large, the Australian Eucalyptus or blue gum appears to have a most important future. Its growth is rapid, its timber strong and durable, and considered as a crop the thinnings will, after the first five years, pay the cost of cultivation, and at the end of twenty years pay for the capital invested besides a liberal interest. Mr. Elwood Cooper says it will give larger returns than the cereals. Over how large a portion or in what parts of our South-west the blue gum will flourish must be decided upon trial.

The white poplar or abele, which has been introduced here from Europe and which multiplies so rapidly by *suckers* as to prove a nuisance, has a really good wood for many purposes, and like others above named especially commends itself to the western plains.

The rule to observe for each densely settled district is to see that enough young trees of the most desirable species in the native sylva are planted to keep at least one acre out of four or five in timber, unless it shall be proven that introduced trees are more desirable than the native. Another important rule is, keep the ridges and the mountains when unavailable for agriculture in forest growth.

We can specify but few out of the most important trees, though for the Middle Atlantic States we may safely name the following: white pine is rapidly disappearing; it will always have a value; it will grow on most diverse soils; it will grow (if properly cared for during the first ten years) to a marketable size inside of forty years (though of course a century would be better); it will pay for itself year by year, after the first five years, by the thinnings from the plantation.

The western Catalpa (*Catalpa speciosa*, Warder) is of rapid growth, attains a fair size, has wood of great durability, and is strong enough for such important purposes as railroad ties; besides it will grow over a large range of country, and in the most diverse soils.

The common locust (*Robinia Pseud-acacia*), which is a native of our rough mountain sides, will thrive as well in the rich soil of a "river bottom," and has all the merits of the Catalpa, besides being better known and more thoroughly tested. Beyond doubt the cultivation of this tree would pay large returns on the capital invested. Of late years it has become infested by a borer.

The same may be said of the chestnut, save that it is somewhat less durable and strong; it has however a large range of usefulness.

Black walnut (*Juglans nigra*) is now undergoing trial on a large scale by competent business men in West Virginia, and so far as information goes with satisfactory results.

For mature timber one must wait longer than the above species require if he would undertake growth of oak. Of these species the most desirable is beyond doubt the white oak (*Quercus alba*), to mature which at least a century would be requisite. That the time is coming in which a growing oak-grove will have a cash value long before it is ready for the axe hardly admits of a doubt. It may, it is true, be a "legacy for the grandchildren," but it will be one which can be converted into ready money.

One essential question is: Will forest-culture ever pay in the United States? Probably in another half century it will be as generally recognized over the whole country as it now is in Germany or in France. Already it has thoroughly commended itself to the citizens of Nebraska and Kansas, where it has reduced the price of wood for fuel from $8 to $4 a cord. In Nebraska one practical tree-grower asserts that as a business raising trees there ranks next to raising stock. In such otherwise waste grounds as certain parts of Cape Cod there can be no doubt as to the importance of immediate forest production. What is now true of such regions will speedily become true of much wider areas in our country.

The above may be regarded as the personal proprietary aspects of forestry. What follows is more nearly connected with State forestry, in which the general good rather than individual advantage is to be consulted.

V. Effects of Forests on Rainfall and in Protecting the Surface of the Earth.—The belief that forests actually increase the rainfall is widespread and general. However, no satisfactory evidence has been forthcoming. To form a correct conclusion required an examination of most carefully kept tables which embraced a long range of years. This has been done by Sir Gustav Wex, imperial and royal ministerial councillor and chief engineer of the improvement of the Danube at Vienna. He undertook a critical examination of the tables, in which were noted the height of the water five times a year for many years, and reached the following results:

> The Rhine at Emmerich had from 1770 to 1802 a mean height of 10 feet 6.74 inches; but from 1803 to 1835 the mean was 9 feet 1.26 inches. At Cologne between 1782 and 1808 the same river had a mean of 9 feet 7.01 inches; but from 1809 to 1835 the mean was 9 feet 2.89 inches.
>
> The Elbe at Magdeburg from 1728 to 1777 showed a mean of 8 feet 10 inches; but the mean from 1778 to 1827 was 7 feet 4.33 inches, and from 1828 to 1869 the mean was 6 feet 1.98 inches.
>
> The Oder at Kustrin from 1778 to 1806 gave as a mean 4 feet 9.12 inches; from 1807 to 1835 the mean was 3 feet 10.69 inches.
>
> The Vistula at Kurzebrack gave from 1809 to 1840 a mean of 6 feet 10.64 inches; from 1841 to 1871 a mean of 5 feet 5.39 inches.
>
> The Danube at Vienna gave from 1826 to 1848 a mean of 1 foot 7.97 inches; from 1849 to 1871 a mean of only 10.89 inches.
>
> Here, then, we have five rivers whose flow has been most carefully considered and all leading to the same conclusion that there is a decrease in the water carried during the last period for which the observations were made. In order, however, to put a check upon any observations taken upon mean height alone, another set of observations was made with the result of showing that from 1840 to 1853 (13 years) the Rhine discharged at Germersheim an annual mean of 53,154,869,396 cubic yards of water, but during the ensuing 13 years (from 1854 to 1867) the mean annual discharge was only 44,061,059,828, thus showing a decrease in the second period of 9,093,809,568 cubic yards.

The important point now was to trace this decrease in the water carried to the destruction of the forests. Gathering his data from observations made and opinions formed by the most distinguished and capable observers over the globe, the author makes it almost impossible to doubt that the alleged connection is true. Becquerel, Boussingault, Hershel, Arago, Känitz, Lecoq, Tchihateff, and the English Commission appointed in England in 1851 to investigate this subject, Blanqui, Marchaud, Meldrum at Mauritius Island, Dr. Graham at the Madeira Islands, Mathieu in a French imperial school of forestry, Dove, and Gräger, all bear direct testimony in favor of this connection.

In our own country it is well known that since Utah has been settled and tree-planting actively prosecuted by the Mormon population there has been a marked increase in the precipitation. It has become the custom to explain this by the statement, undoubtedly true, that Utah had for an unknown period been undergoing a period of increasing desiccation, but that a change had taken place, that the time for the periodic increase had come, and that to this cosmic relation and not to the tree-planting the increased precipitation is due. In the first place, granting such periods of greater or less rainfall, the application of the law in this case is absolutely gratuitous, and in the second place large portions of Arizona and New Mexico appear to have undergone a like desiccation, but no corresponding increase in precipitation has been noted, and we may just as rationally infer that this is because there has been little or no increase in the tree-producing areas. Still it must be said that there is yet no positive evidence that forests increase the rainfall of a region. Recent statistics from the Adirondack Mountains make it more doubtful than ever.

There is one more aspect from which this relation of rainfall to forests may be considered. Even if we did not regard as proven the greater rainfall in earlier years in the regions of Europe which we have considered, there can be no doubt but that the forests do in the most marked manner aid in utilizing what does fall. A comparison of a treeless with a well-timbered region will show that in the former the number of destructive freshets is greater even with the same precipitation than in the latter. There being no leaves, roots, and undergrowth to retard the flow of the water, it hurries along the lines of descent from stream to stream, hastening out of the country and producing extensive washes and inundations along its course. Besides this which is directly carried off as surface water much less finds its way along the roots into depths where it would be secure against speedy evaporation, and hence go to feed the perpetual springs and through them the smaller water-courses, and finally ensure a more even average depth of water in the navigable rivers above tide-water. This is a factor which evidently involves the most vital interests of the state, *i. e.*, destructive freshets on the one hand and excessive drought on the other. It may be added there is nothing hypothetical or doubtful in this latter aspect of the problem.

The well-known effects of forests and vegetation in general in fixing sandy soils against high winds, or in holding soil against the washing of swift currents, need but bare mention.

The history of the redemption of the Landes in France by planting the maritime pine is still so fresh that it affords the most available illustration of important public interests subserved by scientific forestry. In our own country, to show how efficient even low shrubby vegetation may be in retaining earth, we may well mention the dunes formed at Provincetown on the extremity of Cape Cod.

VI. FORESTS AS AFFORDING PROTECTION AGAINST EXTREMES OF TEMPERATURE.—This may be considered from the standpoint of the mere obstruction offered to driving storms, where a few lines of close evergreen growth will suffice for considerable areas. Nurserymen are thus in the habit of protecting more tender plants by hedges of hardier ones; and so well is the efficiency of this protection known and recognized that in Iowa and other North-western States the people have more than once appealed to their legislatures to have trees planted along the roadsides as a protection to human life against the sudden and terrible winter-storms to which the region is subject.

During summer, at least, forests may be regarded as tending to produce a mean rather than an extreme climate. The reasons appear to be obvious. Thus in summer the shade protects the ground from becoming so excessively heated, and both evaporation and atmospheric circulation are less rapid. This, with the moisture which the leaves draw up through the roots from great depths and which is constantly given off by the leaves, prevents a rapid radiation by night of what heat the earth received during the day. Contrast this with the climate of open desert areas where the earth becomes intensely heated by the sun's rays, but where absence of aqueous vapor in the atmosphere allows so free radiation of the heat by night that before morning ice may form in midsummer.

The popular idea that forests are warmer in winter than the open ground is, if recent experiments be reliable, not true. From time immemorial savage nations have sought shelter for themselves and their domestic animals in forests against inclemencies of weather. Nor can there be any doubt but that protection has been rendered. This, however, is to be explained otherwise than by a supposition that the temperature was higher among the trees, for thermometric observations prove that it is during winter often lower there than in the fields. The protection comes partly from the velocity of the wind being less than in the open ground, and hence the animal heat is less rapidly carried away. Just as burial in a snow-bank would afford protection in the same way for a time at least.

The literature of forestry in this country is meagre in the extreme. G. B. Emerson published in 1846 an important pioneer work, *Trees and Shrubs of Massachusetts*, which has recently been enlarged.

Under the auspices of the general government Dr. Franklin B. Hough published two important *Reports upon Forestry* (1877 and 1878–9). These volumes as compilations of all the available literature and as giving the results of extended observation are marvels of well-executed labor, and are monuments to the industry of the author. The same writer has published a *Manual of Forestry* (1883). Prof. Sargent, director of the Arnold Arboretum, has for years been making our forest trees a subject of special study. His connection with the Census Office of the general government has resulted in the production of a work which in the completeness and exactness of its details is a credit to the nation as well as to the author and his associates. As a justification for this science, which is old in the old world and new in the new, one may well quote the words of the Hon. Mark Dunnell, of Minnesota: "In recent journals we see accounts of gigantic monopolies springing up for 'cornering' the great supplies of timber still in the hands of the government on the Pacific coast. Should we not 'corner' these monopolies in the interest of the government before we get 'cornered' by them?" We may also ask, of what special value would these timber lands be to shrewd private speculators if a scarcity of timber were not impending? William Penn was wise enough to anticipate a time when timber might become scarce even in his then densely wooded domain, and to stipulate that one acre in six should remain uncleared; especially that oak- and mulberry-trees should be spared in the interests of silk and shipping. The last ten years have witnessed an increasing interest in the protection of our forests. A national forestry congress has done much to call attention to the importance of the subject. Besides this there are now many State forestry associations. (J. T. R.)

FOREY, ÉLIE FRÉDÉRIC (1804–1872), a French marshal, was born at Paris, Jan. 10, 1804. Graduating at the military school of St. Cyr in 1822, he made campaigns in Algeria in 1830, in 1835, and again in 1840. Returning to France in 1844 with the rank of colonel, he became general in 1848. For his energetic support of the *coup d'état*, he was in 1852 made general of a division. For a short time in 1854 he had command of the French before Sebastopol. Invading Italy in 1859 he defeated the Austrians at the bloody battle of Montebello, May 20, and received many marks of honor from Napoleon III. In July, 1862, Forey was sent with reinforcements to the French army in Mexico, with full civil and military powers. He arrived at Vera Cruz Sept. 27, and soon suspended the government of Almonte. After some reverses Forey captured the city of Puebla, May 17, 1863, and entered the city of Mexico June 10. For these successes he was made a marshal of France, July 2. His confiscation of the property of all Mexicans who opposed the invasion and his arbitrary conduct necessitated his recall. Transferring his military authority to Marshal Bazaine he returned to France, where he had command of an army corps and of the camp at Chalons. He died at Paris June 20, 1872.

FORMES, KARL JOHANN, a German basso singer, was born at Mühlheim, on the Rhine, Aug. 7, 1818. He had already entered the priesthood, when the remarkable qualities of his voice induced him to prepare for the stage. He first appeared in January, 1842, at Cologne as Sarastro in Mozart's *Magic Flute*. His enthusiastic success procured an immediate engagement for three years. In 1845 he was called to the Imperial Theatre at Vienna as primo basso, but being implicated in the revolutionary movements there in 1848, he was obliged to retire to Hamburg, and afterwards went to England. He also visited Russia and Spain, and from 1852 to 1857 he appeared in the Italian opera at Covent Garden, London. In 1857 he came to the United States and appeared at the New York Academy of Music in December. His triumph here was as marked as in the European capitals, and he expressed his intention of making America his home. However, he again visited Europe, and in 1874 appeared on the stage at Berlin. But his voice had then lost its flexibility and power, and even his undoubted dramatic ability seemed to have declined. In the height of his career he was equally successful in comic and in tragic rôles, and he added to his reputation by singing in oratorio. His principal parts were Sarastro, Marcel, Figaro, Bertram, and Plunkett.

His son, Ernst, born at Mühlheim, Jan. 30, 1841, has been highly successful as a comic actor, appearing at Berlin, Dresden, Hamburg, and other German cities.

FORNEY, JOHN WEISS (1817–1881), an American journalist, was born at Lancaster, Pa., Sept. 30, 1817. After learning the printer's trade he became editor of a paper when only twenty years of age. In 1845 he was made deputy-surveyor of the port of Philadelphia, and removing thither became editor of the *Pennsylvanian*. In 1851 he was chosen clerk of the United States House of Representatives, and was also editor of the *Union*, a Washington Democratic paper, till 1856. In that year he exerted himself for the nomination and election of James Buchanan to the Presidency. A year later, Forney, disappointed in his expectation of being elected United States senator from Pennsylvania, started in Philadelphia the *Press* as an independent Democratic paper. Before long he was an earnest opponent of Buchanan's policy in reference to slavery, and the *Press* became a leading organ of the new Republican party. In 1859 Forney was again clerk of the House, and in 1861 was chosen secretary of the Senate. Besides the *Press* he now conducted the Washington *Chronicle*, and throughout the civil war these papers were prominent and able representatives of northern public opinion. In 1868 Forney retired from his secretaryship, and in 1871 he was appointed collector of customs at Philadelphia. He then relinquished the *Chronicle*, and in 1877 the *Press*. He afterwards established *Progress*, a weekly paper, which he edited till his death, Dec. 9, 1881. He had published in book form *Letters from Europe* (1867), *Anecdotes of Public Men* (1873), and a novel.

FORREST, EDWIN (1806–1872), an American tragedian, was born at Philadelphia, March 9, 1806. He early displayed dramatic talent, making his first appearance as Douglas at the Walnut Street Theatre, Philadelphia, Nov. 27, 1820. He then went on a professional tour through the West, and on his return was engaged at Albany and Philadelphia. His delineation of Shakespeare's characters gave him fame, and in 1826 he appeared at the Park Theatre, New York, as Othello. His splendid figure, hard study, and thorough determination to succeed gave him the foremost place on the New York stage. Plays were specially written to enable him to display his matchless powers. Among these were John H. Stone's *Metamora*, in which Forrest took the title role, Dr. R. M. Bird's *Gladiator*, in which he enacted Spartacus, and later R. T. Conrad's *Aylmere*, in which was his famous part Jack Cade. On visiting England in 1835, Forrest was warmly received by both actors and critics. On his second visit in 1837 he married Catharine Norton Sinclair, daughter of a ballad singer. His third visit in 1845 was marred by a violent quarrel with Macready, who had formerly befriended him. When Macready came to New York in 1849, Forrest's partisans banded against him, and a bloody riot ensued at the Astor Place Theatre. In the same year began the scandalous suits for divorce between him and wife. A divorce was granted to Mrs. Forrest in 1852, and the professional skill of her lawyer, Charles O'Conor, secured for her all her legal rights and $3000 a year as alimony. Forrest's conduct throughout the trial alienated the regard of society, though his dramatic ability drew large audiences whenever he appeared. After securing an ample fortune he purchased in 1850 an estate on the Hudson, where he built a stone mansion called

Fonthill. This was afterwards sold for a convent, and Forrest removed to Philadelphia. In 1865 he purchased a handsome country-seat at Springbrook in that vicinity. Although he had retired from the stage in 1858, he was induced to reappear in 1863, and again in 1867. Among his later impersonations that of King Lear was the most noted. From his last engagement in 1871 illness compelled him to retire, yet in the autumn of 1872 he gave Shakespearian readings. He died of apoplexy at Philadelphia, Dec. 12, 1872. By his will the greater part of his fortune was left to establish a home for aged and destitute actors at his country-seat. His magnificent library, especially rich in Shakespearian literature, was almost entirely destroyed by fire in his house at Philadelphia, Jan. 15, 1873. Forrest was not only a great tragic actor, but an excellent critic, and possessed refined literary taste. His impetuous temper brought him into troubles which embittered his life, yet he was in general of a frank and social disposition. His *Life* has been written by James Rees and W. R. Alger.

FORREST, NATHAN BEDFORD (1821–1877), an American general, was born in Bedford co., Tenn., July 13, 1821. He removed to Mississippi in 1834, and after managing a farm entered into business at Hernando, Miss. In 1842 he removed to Memphis, Tenn., where he dealt in slaves and land. In 1859 he became a cotton planter in Coahoma co., Miss. Soon after the outbreak of the civil war he raised a cavalry regiment, and being made lieutenant-colonel in October, 1861, led his men to Fort Donelson. He escaped from the fort before its surrender and reached Nashville, Feb. 18, 1862. He was afterwards engaged in the battle of Shiloh. In June he held command of the cavalry at Chattanooga, and in July was made brigadier-general. He fought at Chickamauga, Sept. 19–20, 1863. While commanding in Northern Mississippi he was appointed major-general, and in April, 1864, captured Fort Pillow, where the negro soldiers were inhumanly butchered. He was promoted to be lieutenant-general in February, 1865, and surrendered at Gainesville, May 9, 1865. He engaged in business after the war and became president of the Selma and Memphis Railroad, but resigned in 1874. He died Oct. 29, 1877.

FÖRSTER, ERNST JOACHIM (1800–1885), a German art-writer, was born at Münchengossenstädt, Bavaria, April 8, 1800. He studied theology and philosophy at Jena and Berlin, but in 1822 abandoned these for painting. He was instructed by Cornelius at Munich, and soon was employed in painting frescos in the Aula at Bonn and in the Arcades at Munich. In 1826 he visited Italy and began the researches in art-history which he afterwards prosecuted in Germany, France, Belgium, and England. The results of his journeys and studies are given in a long series of publications, the first of which was *Beiträgen zur neuern Kunstgeschichte* (1835), and the most important *Geschichte der deutschen Kunst* (5 vols., 1851–62); *Denkmale der deutschen Baukunst, Bildernei und Malerei* (12 vols., 1855–69). After the completion of these works on German art he undertook a similar service for Italian art, and published *Geschichte der italienischen kunst* (5 vols., 1869–78), and *Denkmale italienischer Malerei* (4 vols., 1869–82). In his researches in Italy he made important discoveries and restorations, bringing to light works of Raphael and David. Förster assisted in editing the *Kunstblatt*, continued the translation of Vasari's *Lives of the Painters*, commenced by Schorn, and wrote the biographies of J. G. Müller, Raphael, and Peter Cornelius. Having married a daughter of Jean Paul Friedrich Richter, he published several books relating to his father-in-law, and edited his letters and remains. He died May 10, 1885.

FÖRSTER, HEINRICH (1800–1881), a German prelate, was born at Grossglogau, Silesia, Nov. 24, 1800. He was the son of a painter and was educated at the University of Breslau. Having been ordained priest April 17, 1825, he was chaplain at Liegnitz and afterwards pastor at Landshut. For the excellence of his pulpit oratory he was in 1837 attached to the cathedral at Breslau and became inspector of the theological seminary there. In 1844 the movement of Ronge and others for a German Catholic Church, and again the revolutionary movements of 1848, called forth his powers as a preserver of ecclesiastical discipline. On the death of Diepenbrock, Prince-bishop of Breslau, Förster was chosen his successor, May 19, 1853. His biography of his predecessor was widely read. Bishop Förster had several controversies, especially with Baltzer, the founder of a free religious community at Nordhausen, and with the theological faculty at Breslau. Though he had declared his opposition to the doctrine of papal infallibility before the Vatican Council, yet he submitted on its promulgation and instituted severe measures against those who rejected it. During the *Kulturkampf* the efforts of the Prussian government to control ecclesiastical affairs were baffled by his obstructions. For such acts he was repeatedly fined and at last was suspended from his office, Oct. 6, 1875. He had, however, already removed his residence to Johannisberg, in the Austrian part of his diocese. He died there Oct. 20, 1881. Among his published works are: *Homi lien auf die Sonntage des Katholischen Kirchenjahres* (1851); *Der Ruf der Kirche in die Gegenwart* (1852); *Die Christliche Familie* (1854); *Kanzelvorträge* (1854).

FÖRSTER, WILHELM, a German astronomer, was born at Grünberg, in Silesia, Dec. 16, 1832. He studied mathematics and natural science at Berlin, and astronomy at Bonn, graduating in 1854. In October, 1855, he was made second assistant at the Berlin Observatory, in 1860 he became first assistant, and in 1863 professor extraordinary of astronomy in the University. In 1865 he succeeded Encke as director and has since been editor of the *Astronomisches Jahrbuch* and contributor to the *Europaisches Gradmessung*. At the end of 1868 he was appointed a director of the commission for the introduction of the metric system of weights and measures into Germany. Besides his scientific papers contributed to various journals he has published popular sketches of the history of astronomy and the lives of distinguished astronomers.

FORSTER, WILLIAM (1784–1854), an English philanthropist, was born at Tottenham, near London, March 23, 1784. He was of Quaker descent, and after becoming a minister of the Society in 1805, he spent much time in religious journeys to various parts of England. In 1816 he married Anna, a sister of Thomas Fowell Buxton, and settled at Bradpole. In 1820 he visited the Friends' meetings in the United States, travelling as far west as Indiana, and as far south as Georgia. In 1843 he went on a missionary tour in France, and in September, 1845, he was sent to the United States to endeavor to heal the division among the Friends in Indiana, due to the agitation of the slavery question. He afterwards travelled through Scotland and the north of England, and in 1846 he made a memorable visit to Ireland during the famine. In 1849 he was commissioned by the Yearly Meeting of London to present to the rulers of Christian countries an address on slavery and the slave-trade. With this object he visited most of the countries on the continent of Europe, being everywhere treated with great respect. Coming again to the United States in 1853, he had interviews with the President and with the governors of several of the Southern States. Before his mission was completed he died at Holston, Tenn., Jan. 27, 1854.

FORSTER, WILLIAM EDWARD, an English statesman, only son of the preceding, was born at Bradpole, Dorsetshire, July 11, 1818. He was educated at the Friends' School, Tottenham, and engaged in worsted manufacture at Bradford. In 1850 he married the eldest daughter of Dr. Thomas Arnold, of Rugby. He entered Parliament in 1861, being chosen from Bradford as a liberal. From November, 1865, to July, 1866, he was under-secretary of state for the colonies, and from 1868 to 1874 he was vice-president of the committee of council on education. Under his auspices the Education Bill of 1870 was passed, which greatly improved and extended public instruction in England. Mr. Forster was also a prominent advocate of suffrage by ballot, and assisted in passing the Ballot Bill of 1871. In 1874, after the Conservatives had regained power, Mr. Forster made a visit to the United States, where he was cordially welcomed. In 1878 he was chosen Lord Rector of Aberdeen University. In 1880, when Mr. Gladstone became prime minister again, Mr. Forster entered the cabinet as chief-secretary for Ireland. The difficulties of this position were greatly increased by the sufferings of the Irish people from bad harvests and the agitation of the Land League. With the utmost desire to relieve the distress of the people, by changes of the land laws, Mr. Forster felt it necessary first to pass the Coercion Bill, granting to the Lord Lieutenant of Ireland extraordinary powers for the suppression of disturbances. In 1881 he retired from the Cabinet, on account of the English interference in Egyptian affairs.

FORSYTH, John (1780–1841), an American statesman, was born at Fredericksburg, Va., Oct. 22, 1780. He graduated at Princeton College in 1799, studied law, and began practice at Augusta, Ga., where his father had settled. He became attorney-general of Georgia in 1808, and was elected to Congress in 1813, and after serving three terms was elected United States senator in 1818. President Monroe sent him as Minister to Spain in 1819, and on his return in 1823 he was elected to Congress, and served two terms. He was governor of Georgia from 1827 to 1829, and then was again elected to the United States Senate. Before the expiration of his term he was appointed by President Jackson as secretary of state, and he held this position throughout Van Buren's administration. He died at Washington, D. C., Oct. 21, 1841.

His son, John Forsyth, was born at Augusta, Ga., Oct. 30, 1812. He graduated at Princeton College in 1822, removed to Mobile, Ala., where he became editor of the *Register*. He served as an officer in the Mexican war, and was United States Minister to Mexico from 1856 to 1858. After the formation of the Southern Confederacy, he was one of the commissioners appointed to treat with President Lincoln in March, 1861. He served on the staff of Gen. Bragg during the civil war, and afterwards resumed the publication of the *Register*. He died May 2, 1877.

FORSYTH, William, an English lawyer and author, was born in 1812. He was educated at Trinity College, Cambridge, graduating in 1834. He was called to the bar in 1839, and became Queen's Counsel in 1857, and bencher of the Inner Temple in 1859. He was elected to Parliament from Cambridge in 1856, but was unseated on the ground that as standing counsel to the secretary of state for India he was holding an office of profit under the crown, and was thereby disqualified. He was however elected to Parliament from Marylebone in 1874. He has been a frequent contributor to the *Quarterly Review* and other periodicals, and is well known by his works on legal and historical subjects. In the former class are *The Law of Composition with Creditors* (1841); *Hortensius, or The Duty and Office of an Advocate* (1849); *The Custody of Infants* (1850); *The History of Trial by Jury* (1852). In the latter class we have *Napoleon at St. Helena* (1853); *Life of Cicero* (1864); *The Novels and Novelists of the Eighteenth Century* (1871).

FORT DONELSON was a large earthwork on the left bank of the Cumberland River, one mile below the town of Dover, Stewart co., Tenn. It was erected by the Confederates in 1861, and captured by the Union forces under Gen. U. S. Grant Feb. 16, 1862. The object of the United States military authorities at that time was to advance into Tennessee through Kentucky, principally by using the Tennessee and Cumberland Rivers. A large Federal force was collected in Paducah at the mouth of the former, and a fleet of gunboats at Cairo, the mouth of the Ohio. To circumvent the Federal plans, the Confederates had erected Fort Henry on the right bank of the Tennessee, very near the Kentucky border, and Fort Donelson on the left bank of the Cumberland about 12 miles to the S. E. Pursuant to orders from Gen. Halleck, Gen. Grant on Feb. 1 steamed up the Tennessee with 17,000 men on transports, convoyed by Flag-Officer Foote of the navy, with 7 gun-boats, 4 of which were iron-clad. Fort Henry was garrisoned with 2000 men under Gen. Lloyd Tilghman. The work had 5 bastions, with 12 guns on the river front, and 5 trained inward. Although it commanded a long stretch of the river, it was on low, marshy ground, and was dominated by higher points within cannon range; but Gen. Grant, after making a reconnoissance in a gun-boat, brought his whole force up to Bailey's Ferry, within 3 miles of Fort Henry, where all had debarked by nightfall of Feb. 5. McClernand was directed to move upon the communications leading to Fort Donelson and Dover. The gun-boats steamed up and opened fire. Tilghman soon saw that the place was untenable, and, therefore, ordering his infantry force to fall back, before they were cut off, he remained in the work with but 60 gunners to return the concentrated fire of the gunboats. Com. Foote began the attack before noon, Feb. 6, and Tilghman responded with great vigor; but after making a gallant resistance he surrendered at 2 P. M. The work was given up to the navy; Gen. Grant's troops not arriving until after the flag was lowered. They were at once ordered to advance upon Fort Donelson. The cavalry pursued the escaping garrison, but only 38 prisoners and 2 guns were taken.

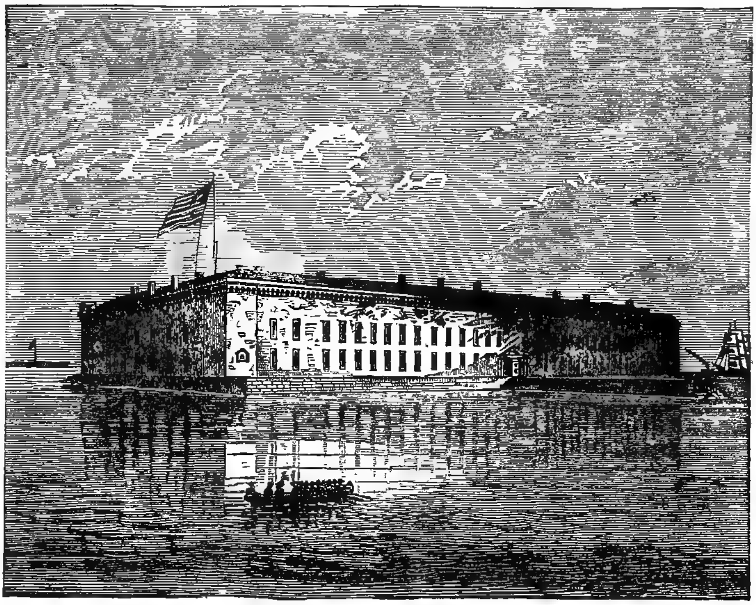
Fort Donelson was erected between the mouths of Indian and Hickman Creeks, which both fall into the Cumberland River, and form a strong natural enclosure. It was an earthwork of numerous bastions and crenates, forming an irregular oblong. It stood upon an elevation of 100 feet, above the ordinary water line, and enclosed in its *enceinte* 100 acres. A bend in the river gave its heavy guns a clean sweep of the channel beyond cannon range. Lower down, on the slope towards the river, were two water-batteries, 30 feet above the water level and with the same sweep: they were formed by a trench 20 feet wide, the earth from which was thrown up in front, and with sand-bag additions made a parapet with embrasures 12 feet wide. In the lower battery were 10 heavy guns, and in the upper 3; besides numerous field-batteries there were 8 heavy guns mounted in the fort. The position was indeed a strong one; it was protected by the river on the east; on the north by the batteries and by Hickman Creek, the back water of which was impassable except by boats or bridges; while all the way round, following the ridges, in an irregular convex, and encompassing the town of Dover, as well as the fort, was an outer line of works, intrenched batteries, and rifle-pits, lying from 1½ to 2½ miles from the fort. All along in front of this line were rude *abatis* or tree-slashings. The Confederate garrison had originally been of 6000 men under Gen. Bushrod R. Johnson, but on Feb. 9 Gen. Gideon J. Pillow arrived with 2000 men to take command. Gen. Clarke's contingent of 2000 came immediately afterwards, and then on the 12th Gens. Floyd and Buckner arrived with 8000. Gen. Polk also sent 1860 men from Columbus, and thus the total of troops—a competent garrison—was about 20,000. Gen. Floyd assumed command as ranking officer. To attack this large garrison, fortified and intrenched, the Union army under Grant numbered only 15,000, and should have been met in the field with superior numbers. The heavy rains had produced such an overflow that Grant was obliged to leave his wagons behind, and all his stores, that he might double-team his artillery for the heavy roads. For two miles out from Fort Henry the country was under water. Leaving Gen. Lewis Wallace with 2500 men temporarily at Fort Henry, Gen. Grant moved the remainder of his force by the two roads running to Fort Donelson and Dover. The First division under Gen. McClernand was in three brigades, commanded respectively by Gen. Oglesby, Gen. W. H. L. Wallace, and Col. Morrison. This division comprised altogether 11 Illinois regiments of infantry, with a regiment and 4 companies of cavalry, and 2 batteries. The Second division, under Gen. Charles F. Smith, consisted of four brigades, commanded respectively by Gen. McArthur, Gen. Lewis Wallace, Gen. J. Cook, and Col. Lanman. Gen. Wallace's brigade had been left at Fort Henry. Besides it, this division comprised 5 regiments of Illinois troops, 3 from Indiana, 4 from Iowa. With these also was a battalion of Missouri artillery, and there were 8 light batteries. In the march to Fort Donelson McClernand was in advance. Smith's division was posted on the Federal left, his left resting on Hickman Creek. McClernand was instructed to push forward to the extreme left of the enemy's position, to the river bank if possible, in order to cut the communication south of Dover. This was the condition of affairs on Thursday morning, Feb. 13. Grant was anxiously awaiting the co-operation of the fleet, and the arrival of reinforcements. He had sent 6 regiments back from Fort Henry by the Tennessee to Paducah to stop the sending of troops up that river, but to have them sent up the Cumberland. These had not yet appeared. In order to prevent further reinforcement of the enemy from Columbus, he despatched a small body of men to destroy the railroad bridge across the Tennessee above Fort Henry. This done, he ordered Lewis Wallace to join him with his 2500 men. There was considerable desultory fighting while these dispositions were being made, and much suffering among the troops from the severity of the weather, the thermometer during the night sinking to 10°. By noon of the 14th Gen. Lewis Wallace had arrived from Fort Henry, and the troops which had come from Paducah under convoy of the fleet were all debarked, bringing the total of Grant's force to 27,000 men. A third division was formed and given to Gen. Wallace, consisting of 3 brigades. It included 2 regiments of Kentucky volunteers, 2 from Indiana, 3 from Ohio, 3 from Illinois, and 1 from Nebraska. This division was posted in the centre, between Smith and McClernand, completing the investment of the fort. It should be observed that the only professional officers with this command were Gens. Grant and Smith and Lieut.-Col. McPherson, who had been temporarily detached from Gen. Halleck's staff to accompany this expedition. By 3 P. M., Feb. 14, Flag-Officer Foote had brought up his gun-boats to the attack. The fleet consisted of 4 iron-clads, each of 13 guns, and 2 wooden gun-boats. After the iron-clad Carondelet had drawn the fire of the water-batteries, the rest steamed up in the form of a crescent, opening fire at the distance of 1½ miles, and halting when within 400 yards. They could only use their bow guns, and after a severe conflict of an hour and a quarter they were obliged to haul off, with material damage, and 54 killed and wounded, among the latter being Com. Foote.

The reinforcements which had come with the fleet were landed from the transports, and McArthur's brigade of Smith's division was ordered round to the Union right to act as a support to Oglesby's advance. The night of the 14th, like the preceding, was intensely cold, and the men were without food and fire. Gen. Floyd having called a council of war, consisting of Gens. Pillow and Buckner, and Col. Gilmer, engineer, the following plan was agreed upon: a sortie should be made the next morning to open a way by which the command could retreat across the Wynn's Ferry road. To effect this Pillow was to attack the right of McClernand with cavalry, Buckner was then to strike his centre, and roll his division back on Lewis Wallace. A clear space being thus made, the whole command, after destroying the stores and munitions, should leave the place, leaving bare earth walls to the besiegers. This plan almost succeeded. Before dawn of the 15th Pillow began the movement. Oglesby and McArthur were obliged to fall back. McClernand sent to Lewis Wallace for aid, which, at first, in the absence of Gen. Grant, he declined to render. But at last he sent Cruft's brigade. At this period of the battle there was dire confusion, in which the details are lost. Federal regiments fired into each other by mistake. Cruft, after a manful resistance, was obliged to retire. It was then that Pillow ordered Buckner to attack with his whole force: he advanced with three regiments. The brigade of W. H. L. Wallace, of McClernand's division, fell back, and the division retreated for half a mile. A mounted officer rode rapidly up, shouting, "We are cut to pieces." Lewis Wallace then ordered Thayer with the third brigade to the rescue; it received and broke a new advance of the enemy, and the sortie had expended its force. The open space, however, had been cleared, and the Confederate troops might have marched out, but Pillow, most unaccountably, ordered Buckner back into his lines, and the movement was abandoned. When the fleet hauled off, Com. Foote wrote a note begging Gen. Grant to visit him on board his ship, as he was disabled. The general started before day of the 15th, and was ignorant of what was passing on his right. On his return he stopped at C. F. Smith's position, and on receiving the reports, determined, with great judgment, to attack at once. Directing Smith to be ready to move at a moment's notice, he rode round to his right, and, undismayed by the disaster, ordered them to rectify their alignments so as to resume the offensive. "Whichever party," he said, "first attacks now will whip, and the rebels will have to be very quick if they beat me." Smith's assault was a model of coolness and dashing valor. He formed his command, Lanman in front, in column of battalions, five companies in each, with sharp-shooters in advance on the flanks, and supported by the fire of Major Cavender's batteries. The regiments rushed forward without firing, crushing down or surmounting the *abatis*, up to the outer works, over and in. Buckner hurried Hanson's regiment forward to repel them, but it was too late. The attacking column was at nightfall in a commanding position, and had two Parrott guns posted to enfilade and take in reverse the inner works of the enemy. Smith lost in his charge 61 killed and 321 wounded. Sixty years old, he spent the night on the ridge without shelter or fire. While this success was being achieved on the Union left, Grant was ordering the troops of Wallace forward, and witnessing the retirement of the Confederates after severe fighting.

On the night of the 15th Floyd called a second council of war at Pillow's head-quarters. There were criminations and recriminations, but it was finally decided to evacuate the place at once, marching out through the space which had been opened. An order was issued to the chief quartermaster to burn and destroy all stores: scouts were sent to see that the way was open. To the consternation of all they returned to report that the ground was almost entirely re-occupied. Pillow then proposed that they should cut their way out. Buckner declared that to be impossible; there was nothing left, he said, but surrender. Floyd and Pillow said they would not be taken. Forrest asked leave to cut his way out with the cavalry, which was granted. Floyd then transferred the command to Pillow, who passed it to Buckner, and these two generals, abandoning their troops to capture, escaped under cover of the night. Buckner, having assumed the command, countermanded the order to destroy the stores, and sent at once for a bugler and a white flag. On Sunday morning, Feb. 16, 1862, the men of Lanman's command heard a solitary bugle, and saw an officer approaching with a flag of truce. His message was from Gen. Buckner to Gen. Grant, proposing an armistice until noon and the appointment of commissioners to arrange for a capitulation. Grant's answer was: "No terms except unconditional and immediate surrender can be accepted; I propose to move immediately on your works." Although Buckner characterized these terms as ungenerous and unchivalrous, he immediately surrendered everything, including 65 guns and from 12,000 to 15,000 prisoners. Forrest had succeeded in getting his command out; it consisted almost entirely of cavalry. The landing place at Dover was thronged with men seeking to escape; the steamers had gone up the river; when they returned at daybreak, Floyd got his Virginia regiments on board, and made off so rapidly that he left his aide behind. "The men," says Badeau, "crowded to the shore, ... filling the steamers to their utmost capacity, those who remained cursing and hissing the officers who were leaving them to their fate." The number that escaped was between 2000 and 3000.

The total of Confederate losses was about 2000. The Union army lost 3329 in all. The results of the capture of Fort Donelson were great and far-reaching: the defensive line from Columbus to Bowling Green was broken, and both these places were soon after abandoned. As a consequence, also, Nashville was evacuated, and the war was carried into the heart of the Confederacy. There was great surprise and excitement in both sections of the country. When the news reached Washington Grant was at once promoted to be a major-general, dating from the day of the surrender; in March the same rank was conferred upon C. F. Smith, McClernand, and Lewis Wallace. (H. C.)

FORT FISHER was an earthwork erected by the Confederates on a low sandy peninsula between Cape Fear River and the Atlantic Ocean, and was intended to protect the entrance to Wilmington, N. C., one of the favorite resorts of blockade-runners. It had a sea-front of 1300 yards, and an arm at right angles to this, 480 yards long. Towards the close of the siege of Richmond, Wilmington was the only remaining source of supplies for that capital, and, therefore, in December, 1864, an expedition was sent against the fort from Hampton Roads. Gen. B. F. Butler, who commanded the expedition, had ordered a vessel to be filled with over 200 tons of powder, and taken as near the fort as possible. This was done early on the morning of Dec. 24, but when the vessel was exploded at the distance of 1000 yards no appreciable effect was produced on the fort. Later in the day the fleet opened fire on the fort, and this was continued next day. Troops were then landed, but the assault being considered impracticable, they were withdrawn and taken back to the James River. A week later another expedition was sent under Gen. A. H. Terry, which landed on the peninsula on Jan. 13, 1865, and protected itself with intrenchments from an attack in the rear. The fleet, which had still remained off the coast, kept up a heavy fire for two nights and throughout the morning of the 15th. The assault was made in the afternoon by the land forces at one end of the shorter side, and by a force of sailors and marines at the other. The latter were driven back by the heavy fire, but the former effected a lodgment, and steadily drove the enemy out of their defences in spite of their stubborn resistance. After six hours' hard fighting the whole of the works were in possession of the Union forces. Gen. Whiting, the Confederate commander, was captured, with 2083 men, 160 pieces of heavy artillery, and many small arms. The Union loss in the assault was 110 killed, 536 wounded, but on the next day by the explosion of the magazine 200 more lost their lives. The other defences of the Cape Fear River were speedily abandoned by the Confederates, though they held Wilmington until Feb. 21.



Fort Sumter.

FORT SUMTER, a noted defensive work of the harbor of Charleston, S. C., occupies a shoal, artificially enlarged, on the south side of the entrance to the inner harbor, 1 mile south-west of Fort Moultrie, ¾ mile north of the northern end of Morris Island, and 3½ miles from the city. It was constructed by the United States government according to plans made in 1827–8. It was built of brick on a rip-rap foundation, and was in form pentagonal with truncated salients. The exterior wall was 38 feet high, and 7½ feet thick. The full armament was to be 146 guns, two tiers being in casemates, and one in barbette. When South Carolina passed its ordinance of secession in December, 1860, the embrasures of the second tier were still unfinished, but the fort had 62 guns mounted, the largest being six 24-pounders, and three 10-inch columbiads. On Dec. 26, Major Robert Anderson (*q. v.*), who had command of the United States troops in Charleston harbor, prudently transferred his little garrison of about 80 men from the defenceless Fort Moultrie to the stronger Fort Sumter. South Carolina troops then occupied all the surrounding points, erected batteries, obstructed the harbor, and extinguished all the coast lights. Meantime the openings which had been left in the walls of the fort were closed, but the attempts of the United States government to introduce reinforcements or supplies failed. After two days' bombardment, which marked the commencement of the civil war, Major Anderson surrendered the fort, April 14, 1861. During its subsequent occupancy by the Confederates its strength was increased; many of the casemates were filled with sand; and its armament was raised to 72 guns and 4 mortars. No direct attempt was made to retake it until April 7, 1863, when Rear-Admiral S. F. Dupont, commanding the South Atlantic blockading squadron, attacked the fort with an iron-clad fleet, consisting of the frigate New Ironsides and eight monitors. After firing 139 shots from 23 guns in 2¼ hours, he withdrew the fleet. One of his vessels was sunk the next day, and others had been seriously injured, while the fort sustained but trifling damage. Seeing the necessity of using the heaviest siege-guns, Gen. Quincy A. Gillmore, on July 10, seized the southern end of Morris Island, and erected batteries, from which, on Aug. 17, he opened a terrific fire on the fort. The distance was about 4000 yards, but the Parrott rifled cannon proved effective, and at the end of a week much of the fort was demolished. The batteries had thrown 5009 projectiles, weighing from 100 to 300 pounds. The fort was silenced, but the Confederates still maintained possession, and were able to repulse a naval attack by boats on the night of Sept. 8. A second bombardment, begun on Oct. 26, from the northern end of Morris Island, was continued for 40 days, but though further damage was done, and many lives lost, the reduction of the fort was not effected. Again, on July 7, 1864, a heavy bombardment commenced, which lasted about two months. The commander of the fort was killed, and the number of guns mounted was reduced to 9. Yet not till after the city of Charleston was evacuated by the Confederates, Feb. 18, 1865, in consequence of Gen. Sherman's march through South Carolina, was the United States flag again raised over the ruins of the fort. By order of President Lincoln this was formally done on April 14, 1865, the fourth anniversary of the evacuation. The same flag which had been lowered was then raised again by Gen. Robert Anderson and saluted by the guns of the fort and of all the batteries which had taken part in the bombardment of 1861. In accordance with a plan approved by the United States government in 1870, there has been a partial restoration of the fort, fitting it for an armament of 35 cannon, besides 4 Gatling guns.

FORTUNE, Robert (1812–1880), a Scotch botanist and traveller, was born in Berwickshire, Sept. 16, 1812. Taught only at a village school he became a gardener. After being employed for some years in the botanical gardens at Edinburgh and at Chiswick, he was sent by the Horticultural Society of London in 1842 to collect plants in Northern China. In this work he was very successful, and after his return he published *Three Years' Wanderings in China* (1847), which gave a new insight into the condition of that country. He was now commissioned by the East India Company to make thorough investigation of the tea-plant, and returned to spend three years more in China. The result is recorded in his *Two Visits to the Tea Countries of China* (1852). After its publication he made a third visit from 1853 to 1856, which is described in his *Residence among the Chinese Islands, on the Coasts, and at Sea* (1857). When an effort was made to introduce the cultivation of tea in the United States in 1857, Fortune was employed by the United States Patent Office to collect the seeds of the tea shrub and other plants, and was thus engaged until 1863. He spent the latter years of his life on a small estate in Scotland. He died April 13, 1880.

FORTUNY, Mariano (1838-1874), the greatest Spanish painter of the nineteenth century, was born at Reus, near Barcelona, June 11, 1838. He studied art at the Academy of Barcelona, then under the direction of Claudio Lorenzales, a pupil of Overbeck. But Fortuny soon swerved from the beaten track. By the excellence of some early designs he won a prize which enabled him to go to Rome in 1858. There he not only sketched from the old masters, but devoted much time to modern life as seen in the streets of Rome. In 1859 he accompanied Gen. Prim in his expedition to Morocco and filled his portfolio with sketches of its barbaric splendor and brilliant skies. He returned to Barcelona to put on canvas the essence of the materials he had gathered, but soon repaired to Rome. Henceforth his works showed him to be the legitimate successor of Velasquez and Goya. Renouncing entirely the classical traditions, he depicted with the utmost care but with startling vigor and matchless color what he had seen in Spain and Africa. Around him gathered a group of young and enthusiastic artists devoted to splendid realism. In 1866, his rank and fame being already established, Fortuny went to Paris, where he came into close relations with Meissonier, and, though their methods were widely distinct, the influence of the great French artist can be seen in the Spaniard's later works. Fortuny's paintings were now eagerly sought for, and American merchants vied with European nobles in purchasing them. Mr. A. T. Stewart, of New York, became the fortunate owner of some of the best, among which were The Serpent Charmer and A Fantasy of Morocco. In 1868 Fortuny went to Madrid, and while there married a daughter of Madrazo, the director of the royal museum, several of whose family had won distinction as artists. He was fortunate in his wife, and his marriage suggested to him one of his most famous paintings, The Spanish Marriage, in which appear the portraits of his wife and of his friend, the artist Regnault. In 1870 Fortuny took up his residence in Granada, where he devoted himself with fresh enthusiasm to painting, to sketching for new works and perfecting his former pieces. He also visited Morocco to revive and deepen his recollections of its life and scenery. To this visit are due The Fencing Lesson and The Tribunal of a Cadi. In 1872 Fortuny returned to Rome, where he lived in princely style, courted by travellers and surrounded by artists. At times he withdrew to other Italian cities to get the relief needed for the prosecution of his work. His health failed in 1873, but he seemed afterwards to have recovered entirely. By imprudently working in the open air in autumn he brought on a fever, of which he died at Rome, Nov. 21, 1874. Besides his oil-painting he gave attention to etching and to water-colors, manifesting in all the same originality and genius. These productions were eagerly sought for and commanded high prices, and engravings of all his famous pictures have been widely circulated.

FORT WAYNE, a city of Indiana, county-seat of Allen co., is at the head of the Maumee River, formed by the junction of the St. Mary's and St. Joseph's Rivers, 148 miles S. E. of Chicago. It is an important railroad centre, being on the Pittsburgh, Fort Wayne, and Chicago Railroad and on the Toledo, Wabash, and Western, with railroads also to Richmond, Grand Rapids, Muncie, Saginaw, and St. Louis. There are seven bridges in the vicinity. Being situated on an elevated plain, Fort Wayne is known as the "Summit City." Its principal buildings are the United States Government house, masonic temple, two hospitals, Catholic cathedral, and some fine churches. There are altogether 25 churches, 10 hotels, 3 national banks, 5 daily and 7 weekly newspapers, a high school, normal school, and 15 other schools. There are also two colleges, a Methodist and a Lutheran. Large railroad-works, machine-shops, and foundries give employment to thousands. There are also large establishments, manufacturing wagons, wheels, furniture, organs, etc. There are 6 flouring-mills, 6 saw-mills, and 15 factories. The city is lighted with gas and electric light; it has water-works and a park. Its property is valued at $16,000,000. The site was early occupied by a French trading-post, and in 1794 Gen. Anthony Wayne established there a fort, around which a town grew. It was laid out in 1825, and in 1839 was incorporated as a city. The completion of the Wabash and Erie Canal in 1842 increased its trade. In 1854 the railroad to Pittsburg was opened, and since that time the city has become a great railroad centre. Its population in 1840 was only 2080, in 1860 it had increased to 10,388, and in 1880 it was 26,880. It is now estimated at 35,000.

FORT WORTH, a city of Texas, county-seat of Tarrant co., is on the Trinity River, at the junction of the Clear and West Rivers, 200 miles N. of Austin. Here the Texas Pacific and Transcontinental Railways unite and form one line to El Paso. The Missouri, Kansas, and Texas Railroad from St. Louis, and the Gulf, Colorado, and Santa Fé also pass through the city. It has daily trains to New Orleans, Galveston, St. Louis, and to El Paso. A railroad intended to reach Denver has been built for 150 miles. There are 3 iron bridges within the city limits. Besides the court-house and other county buildings there are 6 hotels, 5 national banks, 4 weekly and 2 daily newspapers, 10 churches, 9 public schools, 5 private schools, and a college. The industrial works comprise a foundry, a cotton-compress, cottonseed-oil-mill, and flour-mills. The city is well laid out, is lighted with gas, and supplied with water-works. Its property is valued at $7,000,000, and its debt is $320,000. Settled in 1848, it was made the county-seat in 1857, and obtained a city charter in 1873. Yet its real development began only when the Texas Pacific Railway reached it in 1876. In 1880 its population was 6663, but it has trebled since.

FORWARD, WALTER (1786–1852), an American statesman, was born in Connecticut in 1786. Removing to Pittsburg in 1803 he studied law and was admitted to the bar in 1806. He was elected to Congress in 1822, and in the presidential elections of 1824 and 1828 he was the supporter of John Quincy Adams. He was a member of the Pennsylvania Constitutional Convention of 1837. In March, 1841, he was appointed first comptroller of the U. S. Treasury, and in September following President Tyler appointed him secretary of the treasury. Forward resigned in March, 1843, and remained in private life until President Taylor appointed him *chargé d'affaires* to Denmark. He returned to America in 1852 and became presiding judge of the District Court of Allegheny co., Pa. He died at Pittsburg, Pa., Nov. 24, 1852.

FOSS, CYRUS DAVID, an American bishop, was born at Kingston, N. Y., Jan. 17, 1834. He graduated at Wesleyan University, Middletown, Conn., in 1854, and taught in Amenia Seminary, 1856–57. He then entered the New York Conference and was pastor of prominent churches until 1875, when he was made president of Wesleyan University. In 1878 he was the delegate from his denomination to the General Conference of the M. E. Church South. He was chosen bishop in 1880, and has since been active in discharge of the duties of that office.

FOSTER, BIRKET, an English artist, was born at North Shields, Feb. 4, 1825. He was of Quaker descent, and was apprenticed to a wood-engraver. Being confined to bed for seven months he spent the time in close study of engravings. His first work to attract attention was the illustration of Longfellow's *Evangeline* (1850). He afterwards illustrated most of the standard English poets. In 1859 he exhibited at the Royal Academy a water-color, The Mill at Arundel. He afterwards devoted himself to depicting child-life and rural scenes.

FOSTER, JOHN GRAY (1823–1874), an American general and engineer, was born at Whitefield, Coos co., N. H., May 27, 1823. He graduated at West Point in 1846, and entering the engineer corps served with Gen. Scott in Mexico. He was severely wounded at Molino del Rey. After the war he was engaged in the coast survey and at West Point. He was chief-engineer at Charleston Harbor when Fort Sumter was attacked in April, 1861. In October he was appointed brigadier-general of volunteers, and went with Gen. Burnside to North Carolina in February, 1862. In July following he was promoted major-general with command of the department of North Carolina. In December he defended New Berne against Gen. D. H. Hill. This department was afterwards enlarged, the head-quarters being removed to Fortress Monroe. In December, 1863, he was transferred to the department of the Ohio, but soon retired on account of wounds. From May, 1864, to February, 1865, he had command of the department of the South, and afterwards that of Florida, where he remained till September, 1866. He was then placed in charge of works at the harbors of Boston and Portsmouth, N. H. In the regular army he reached the grade of lieutenant-colonel of engineers, with the brevet of major-general. He died at Nashua, N. H., Sept. 2, 1874.

FOSTER, JOHN WELLS (1815–1873), an American geologist, was born at Brimfield, Mass., in 1815. He graduated at Wesleyan University, Middletown, Conn., in 1835, and soon after removed to Zanesville, Ohio, where he became a lawyer. He assisted in the geological survey of Ohio in 1837, making a report on the central district, which included the coal-fields. In 1845 he went to the copper region of Lake Superior, and in 1847 became associated with Prof. J. D. Whitney in the government survey of that district. Their *Report* was published in 1850–51. Mr. Foster afterwards resided in Massachusetts, but in 1858 he removed to Chicago. In connection with his geological researches he had gathered much valuable information in other departments, which he embodied in his works, *The Mississippi Valley* (1869) and *The Prehistoric Races of the United States* (1873). He also published several monographs on American ethnology and contributed to various scientific periodicals. He was for some time land commissioner for the Illinois Central Railroad, and was president of the American Association for the Advancement of Science. He died at Chicago, June 27, 1873.

FOSTER, RANDOLPH S., an American bishop, was born at Williamsburg, Ohio, Feb. 22, 1820. He was educated at Augusta College, Ky., and in 1837 became an itinerant in the Ohio Methodist Conference. He had charge of several churches in Ohio until 1850, and afterwards in New York city and Brooklyn. In 1857 he was made president of the North-western University at Evanston, Ill. In 1860 he returned to pastoral work in New York. In 1868 he was a delegate to the British Wesleyan Conference, and in the same year was made professor of systematic theology in Drew Theological Seminary, Madison, N. J. In 1872 he was elected bishop, and soon afterward went to visit the Methodist churches and missions in Europe and South America. He has published *Objections to Calvinism* (1849); *Christian Purity* (1851; new ed., 1869); *Ministry for the Times* (1855); *Theism* (1872).

FOUQUIERA, OCOTILLO, or JACOB'S WAND. One of the most remarkable shrubs or rather small trees of Western Texas and the great Colorado desert, attracting the attention of all travellers by the singularity of its growth, and the remarkable beauty of its flowers, is *Fouquiera splendens*, so named by Engelmann in the botany of Gregg's expedition, on which it was found by Dr. Wislizenus, the naturalist of the party. The genus was founded by Humboldt on two species discovered in Mexico, and dedicated to Dr. Peter Edward Fouquiere, a physician of Paris. These three are all yet known. It belongs to the natural order *Tamariscinicæ*. The flower has five free sepals, petals united into a tube, the spreading lobes of the limb imbricated. The stamens are ten to fifteen, hypogynous, and exserted; filaments thickened at the base, ovary imperfectly three-celled; placentæ about six, ovuled; styles three, long, and somewhat united; seeds three to six, oblong, flattened, surrounded by a fringe of long white hairs or by a membranous ring.

F. splendens has a main trunk of only a foot and a half high and a foot in diameter, from which arises sometimes a single stem, but frequently ten or twelve erect wand-like branches, with a fan-like spread, generally from 10 to 15, but often 20 or 30 feet high. These branches, or branchless secondary stems, are clothed with gray recurved thorns about an inch long, apparently the bases of undeveloped leaves, and clusters of small secondary leaves appear in the axils. The flowers are scarlet, tubular, nearly an inch long, and terminate the stems in panicles 6 to 10 inches in length. It grows in the most sterile and stony places, and where the hot, dry atmosphere is almost stifling. It furnishes the "ocotillo" poles of the Mexicans. Out of these with strips of rawhide they make admirable fences; and for hedges they cut the pieces of stems into lengths and plant them, when they readily grow. The wood is extremely hard and durable. They are often planted so as to grow up into tall and impregnable barriers around yards and farm-buildings. The stems, according to Dr. Harvard, are impregnated with a resinous substance which makes them excellent fuel—the small scales or chips, which can readily be pulled off from the base of the stems, are invaluable for starting camp-fires. The leaves chewed are pleasantly acidulous. Its common name with American travellers is Jacob's wand and Jacob's staff. (T. M.)

See Vol. IX. p. 433 Am. ed. (p. 491 Edin. ed.).

FOWL. The original ancestry of the domestic fowl is involved in uncertainty. The traditions of the earliest peoples carry back a knowledge of poultry-keeping and cock-fighting to the remotest antiquity. Some naturalists have attributed to the *Gallus Bankiva*, a wild jungle-fowl of India, the origin of all our domestic breeds. On the other hand, naturalists of equal ability and acuteness refer it to the *Gallus giganteus*, another jungle-fowl. It is conceded that some species of the wild jungle-fowls were domesticated. But more knowledge of facts is necessary before the question of origin can be definitely settled. Whatever may have been the original, it was a very different bird from the one we know at present.

Jungle Fowl.

There are several races of fowls, the best known of which are the game-fowl, of Indo-European origin, noted for its beauty and courage; the Asiatic race, of Chinese origin, large in size, docile, abundantly covered with loose, fluffy plumage, and feathered on feet and legs; the East India fowls, close-feathered, clean-shanked, and mostly fierce and cruel in disposition; the European race, of rather spare and upright build, some crested with feathers, others with large combs, compact plumage, smooth shanks and feet, and all good layers.

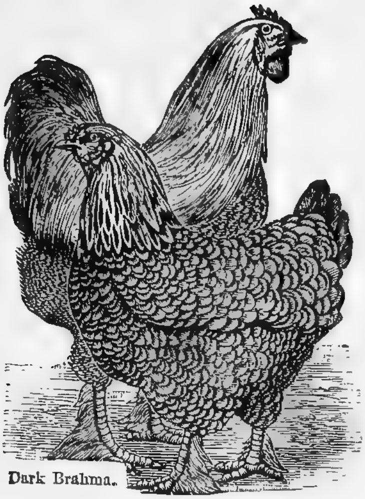
The show standards for poultry recognize the following classes: 1, the American; 2, the Asiatic; 3, the Game; 4, the Spanish; 5, the French; 6, the Polish; 7, the English; 8, the turkey; 9, the duck; 10, the goose; 11, the miscellaneous or unclassified. Each of these so-called classes contains several sub-varieties or breeds, more or less modified in color, crests, combs, etc. The American standard of excellence recognizes about sixty varieties, to which new ones are added from time to time. But this multiplication is a work of fancy rather than of value. For instance, most of the Asiatics are merely variations of what were known forty years ago as the Shanghais. The endless varieties in the Game class are also much alike except in size and color. There are five varieties of Hamburgs, the same of Polish, Leghorns, Dorkings, Cochins, etc., each having the general characteristics of its class, but differing in some minor point of coloring, combs, claws, or in other trivial variations, which can be perpetuated only by the skilled art of the fancier. Some of the most valuable breeds of chickens are such as have been cross-bred from varieties possessing well-established characteristics; thus the Houdan combines some of the characteristics of the English Dorking, the Pomeranian Polish, and the native French stock. So, too, the American Plymouth Rock, a valuable fowl, has been recently produced by a cross of the native Dominique fowl with Asiatic hens.

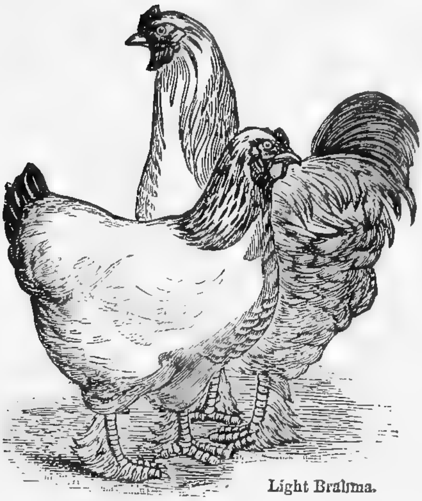
The first Europeans who came to America brought fowls with them, but not much attention was paid to poultry-raising here until within the memory of men now living. There were always a few fanciers and poulterers in and near the seaboard cities, but not until 1850 was any special attention given to the subject, except in the case of a few of the old well-known breeds, as Games, white-faced Spanish, Hamburgs, and the native Dominique fowl and its crosses with the above, which were bred in a small way in the immediate neighborhood of the large cities. The year 1846 marked an epoch in the raising of poultry in the United States. In that year the first Asiatic fowls were introduced, and created an immediate sensation. By 1850 the "poultry craze" had fairly set in. The new breed was sent to England. An enterprising Yankee presented Her Majesty Queen Victoria with some of the famous birds, and an uncommon interest in poultry was soon manifested. Poultry clubs and societies were organized. The first poultry-show in America was held at Boston in 1857, but the first home of the Asiatic fowl on the Western continent was Philadelphia, whence it was soon distributed to New England, and thence to Western Europe. The interest in poultry being thus awakened, seafaring men brought fowls from different parts of the world, and several new foreign breeds were introduced. Among the most noted of these were the Leghorns from Italy, between 1855 and 1865. In 1867 the French breeds were introduced. The Dorking was brought from England, the Silkies from Japan, and many varieties from the Indian Archipelago and elsewhere, most of which, however, were more novel than useful. Thus, from 1855 to 1875 the world was searched and varieties more or less valuable were contributed to the general poultry-stock.

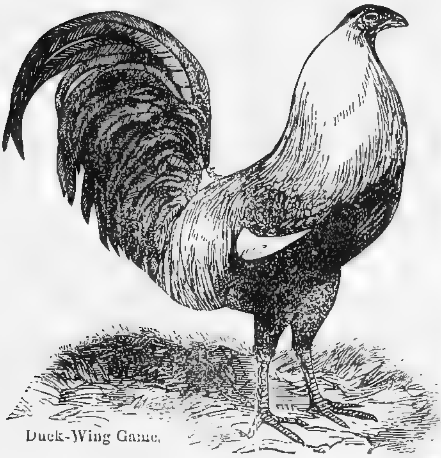
The really useful breeds are embraced in a short catalogue. They are the Asiatics, Brahmas and Cochins; the English, Dorkings and Hamburgs; the French, Houdans and Crevècœurs; the Spanish, including the Leghorns; the Dutch Hamburgs and crested Polish; and the old-fashioned native Dominique. In addition to these, Games and Bantams are an important ornamental class. With these as a basis the fowl-stock of the country has been made up, and since 1870 the interest in poultry has spread from the Atlantic to the Pacific.

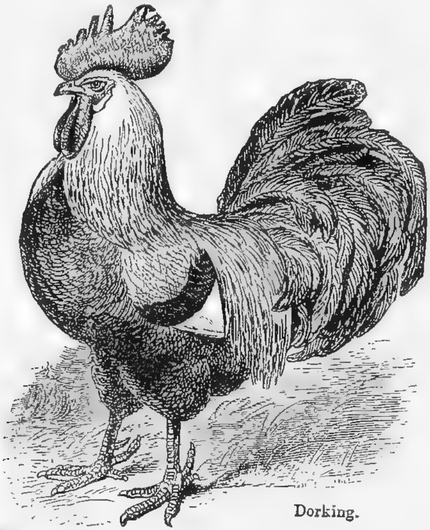
The turkey is certainly a great acquisition to our

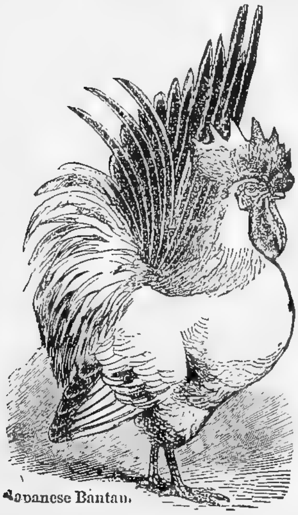
FOWL. *PLATE XXVI.*

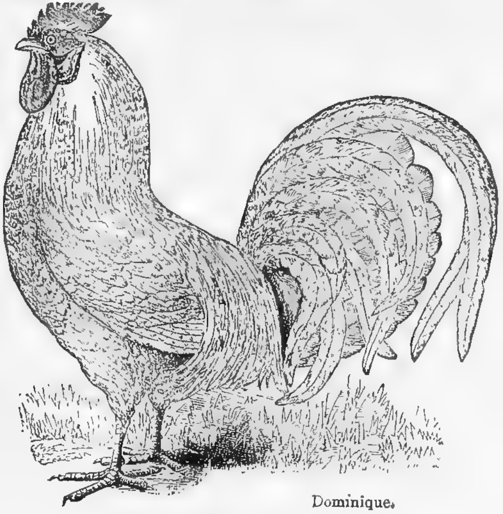

Dark Brahma.

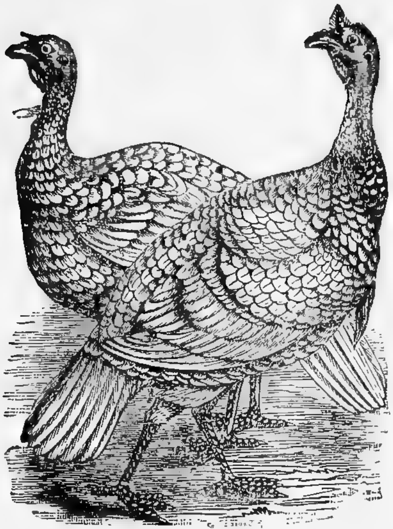

Light Brahma.


Duck-Wing Game.

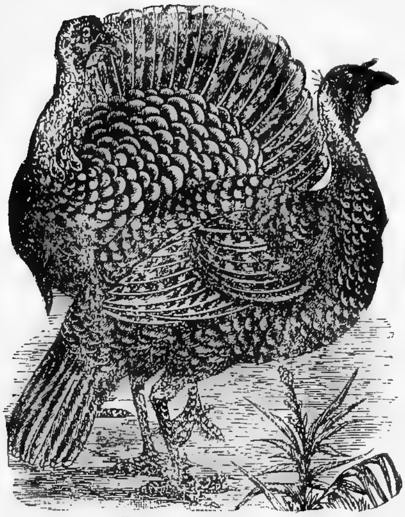

Dorking.


Japanese Bantam.

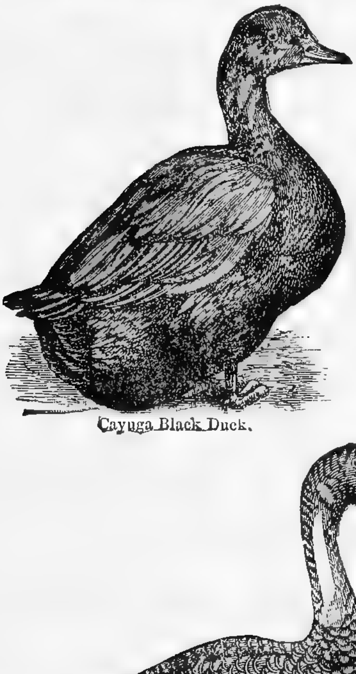

Dominique.



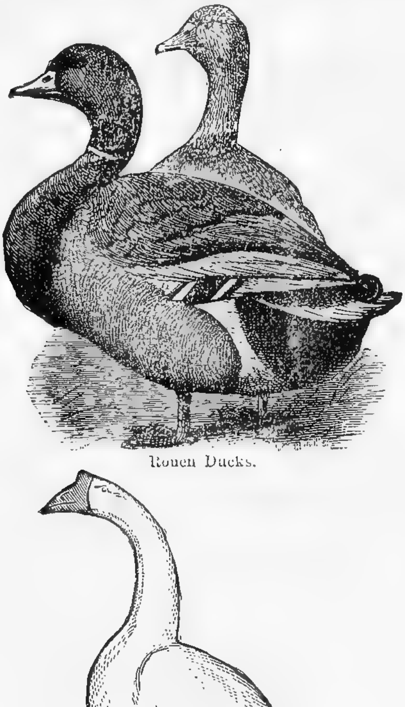
Light Bronze Turkeys.



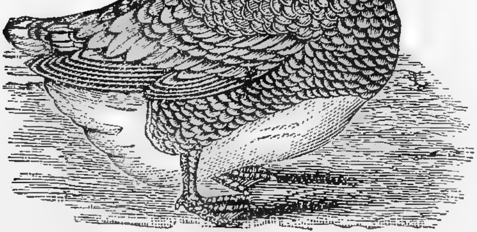
Dark Bronze Turkeys.



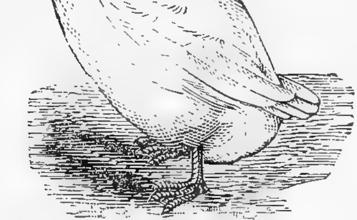
Cayuga Black Duck.



Rouen Ducks.



Hong-Kong Goose.



White China Goose.

poultry-stock. Its large size and great hardiness, after its early life of chickhood is passed, make it a desirable bird to raise. The turkey-hen lays 18 to 24 eggs. The first-laid ones are usually placed under ordinary hens for incubation; the remainder are hatched by the turkey-hen, and all the young are allowed to run and forage together when they are large enough to go abroad. The delicacy of the young poults is doubtless due to a want of fresh blood in the long domesticated strains. In the breeding of turkeys, as of fowls, new blood may easily be procured. Breeders have recently crossed their strains with the wild birds, and have greatly increased the size and vigor of the turkey. The best known of these recent crosses is the bronze turkey, a very fine, large bird, the heaviest of the hens weighing at maturity 25 pounds, and cocks as high as 40 pounds each. The best breeding-stock is two- and three-year-old hens and a full-sized cock-bird not less than two years old. If the cock is very large and heavy, he should be penned up and fed sparingly to reduce his weight previous to the mating-season. With proper management, there is little if any more difficulty in rearing turkeys than chickens. The turkey-hen and her brood are kept in a large coop slatted in front and placed on a dry, sheltered grass-run facing the sun. The feeding and management are much the same as for other young broods. They must be kept dry and clean, fed often, and supplied with fresh water or milk two or three times a day. Well-drained curds, mixed with finely-chopped onion- or garlic-tops and dandelion-leaves, are excellent food for young turkeys, and the green food must not be omitted from the time the chicks are a few days old. The food must of course be out of reach of the mother-hen; and as young turkeys are sometimes very stupid about learning to eat, a newly-hatched chicken or two cooped with the turkey-chicks will soon teach them. When the broods are three or four weeks old the mother-hen may be let out on fair days, after the grass is dry, to go abroad with the brood, but all must be brought back to the coop before night or on the approach of rain. As soon as the young can go up to roost, they should be furnished with a proper perch in the turkey-house, and encouraged to use it. Turkeys dislike to roost with other fowls, and should have a house or high open shed of their own, with lofty perches. The American standard recognizes six varieties of turkeys—viz., the bronze, Narragansett, black, white, buff, and slate; mongrels are not recognized or classified. The turkey attains its full size in its third year, but all except breeding-stock are fattened and slaughtered under one year old at an average weight of 13 pounds for hens and 19 pounds for cocks. In many parts of the country, particularly east of the Susquehanna Valley, the turkey-crop is valuable and considered profitable, and in all except densely-populated districts it should be more largely cultivated. The turkey is an excellent forager, consuming innumerable insect pests, and, although disliked in the fields by those who are not well acquainted with it, does very little damage to growing crops.

The duck occupies a less prominent place in American poultry-yards than in those of England and France. There are several breeds of domestic ducks, all originating from the wild mallard. The larger and most useful breeds for domestic purposes are the Aylesbury, Rouen, Pekin, Cayuga, and Musk or Muscovy. The Aylesbury duck takes its name from the county-town of Buckinghamshire, England, where it has been bred from time immemorial. It is a beautiful pure white bird in both sexes, with orange-colored feet and legs, and in its native place a flesh-colored bill; in America the bill cannot be retained of this color, but becomes yellow. Except the Pekin duck, introduced from China in 1872, the Aylesbury is the best layer of all the ducks, and has been known to produce 120 eggs in a year. The young of all the ducks are mostly hatched under common hens. Two, and sometimes three, broods are given in charge of one hen, and are reared much as other young poultry. They need no water except for drink during the first month, after which they should have a shallow vessel of water to play in; but they may be allowed a running stream or pond after they are two months old, though they are often successfully reared with only a large trough or tub of water in their runs. The next best-known duck is the Rouen, supposed to have originated at the city of that name in France. This is also an excellent duck, and more nearly resembles the wild mallard in plumage than any other of the domestic breeds, the green head and the white band which nearly surrounds the neck of the drake being the same as those of the wild ancestor, and the general plumage in both the male and the female resembling that of the wild bird in many respects. The drake and the duck in this breed are quite unlike in color, and in this respect they differ from the other pure breeds of ducks in domestication. The feet and legs of the Rouen are of a bright orange, while the bill is dusky yellow tinged with green. The Rouen is heavier at maturity than the Aylesbury by a pound or more. The strong points of the latter are its early maturity and its early readiness for market. It is ready to kill at eight to ten weeks old, and with proper feeding weighs 5 to 6 pounds the pair at that age. The best food for ducks reared for early marketing is ground oats, corn, barley, and buckwheat made into gruel, and chandlers' greaves. The Pekin duck is pure white, somewhat tinged with a creamy yellow, with orange-colored legs, feet, and bill. It is a good duck, and valuable as a cross on either Aylesbury or Rouen breeds. The Cayuga duck is jet black, the male having a greenish metallic iridescence of plumage which is striking and beautiful. It is a good duck, but smaller than the preceding. The Musk or Muscovy duck comes from South America. It is particolored, of larger size than any other domestic duck, but inferior as a farm-bird. Ducks are all proverbially hardy, are easily reared, and should be more popular with American poultry-keepers.

The goose is a domestic bird of ancient lineage, but its ancestry is easily traced to the wild goose. The two chief domestic varieties are the Embden and the Toulouse. It is difficult to say which of these stands first in point of merit. The Embden goose takes its name from the city of Embden in Westphalia, where it originated. The bird is of spotless white plumage in both sexes, with dark flesh-colored bill and deep orange legs and feet, the eyes being bright blue. The Toulouse geese take their name from the city of Toulouse in France, where they are largely reared. They are gray in color in both sexes, darkest on the neck, shading off gradually to lighter gray on the breast and body, running to white on the belly and hinder parts. The bill is about the color of sun-tanned flesh, and the legs and feet are of a deep reddish orange. These two varieties are the best and most profitable. They are nearly equal in size and weight; the Embden is taller, and the Toulouse a better layer; both are easy to rear, and attain heavy weights by early winter. The goose never lays until she is a year old, and sometimes not until two years old. The eggs are very large and may be hatched under common hens, but the young should be cared for by the geese. They are easy to rear on the same food as other young poultry. They need green food when quite young, and when fledged will thrive on grass alone until fall, when they need some grain to fatten them. A large expanse or stream of water is not necessary for geese, but it is desirable. On every farm where there is a water-course, if it be but a rivulet or brook, a goose-paddock will be profitable, under fair management, both for the feathers and the flesh. The rearing of ducks and geese in this country has been retarded by the abundance of wild waterfowl. But these are rapidly diminishing, and soon the domestic ones will receive more attention. In Western Europe ducks and geese fill an important place in the poultry-market; $100,000 are annually returned to the town of Aylesbury and its vicinity for ducks, to say nothing of other points largely engaged in producing geese and ducks in Great Britain and on the Continent.

The Guinea-fowl comes from Northern Africa, and is well worth raising for its eggs and flesh; the latter is of superior quality. The Guinea-fowl fraternizes with common fowls in the poultry-yard; is somewhat domineering, and rather shy; conceals her nest in the grass; and lays 100 to 120 eggs in a year. The young are at first very tender and difficult to rear. They need careful attention and frequent feeding while very young, but when once started are hardy, healthy, alert, and watchful, and somewhat noisy. They are adapted only to farms or large poultry-yards. The eggs are small, brownish in color, and very rich and good. They are hatched under common hens.

Pigeons may also be considered domestic fowls, and may be kept profitably if systematically managed, but not otherwise. The popularity of pigeons on the farm is owing mainly to juvenile inclinations, and in cities to the fancy which finds amusement and profit in breeding them for show purposes and for racing. The Antwerp or homing pigeon, which is the one used for this sport, sometimes changes hands at high prices. But this kind of pigeon-culture is very different from that of breeding the birds for food.

Management of Poultry.—Except with fanciers and breeders who have given poultry special attention, methods of management are crude, and even primitive. Few practical poultry-keepers have commodious and proper quarters for their stock. Poultry should be furnished with houses devoted to them exclusively, well lighted and ventilated, and kept clean. To every poultry-house, however small, there should be an open-shed attachment for the use of the birds. The house proper need be only large enough to furnish comfortable roosting and laying room, but the shed should be as large and airy as possible, facing to the sun, with a hard, smooth, perfectly dry floor. This floor should be covered to a depth of three or four inches with clean sand, sifted coal-ashes, road-dust, or sifted garden-soil. The surface must be raked over occasionally, and the whole removed and renewed two or three times a year. The droppings from under the perches should be mixed with this dry absorbent, and the whole kept under cover until needed for fertilizing purposes, when it will be found to be very valuable. In the open shed are placed the feeding and watering vessels. The size of the quarters must be proportioned to the number of fowls accommodated. A poultry-house 4 feet by 6 feet, and a shed 6 feet by 10 feet, will be large enough for six hens and a cock, and with an adjoining open run it will accommodate ten hens and a cock. If chickens are to be reared. the laying- and hatching-places must be separated. This will save trouble and some loss, as sitting hens should never be disturbed by other hens. The real wants of poultry are few and simple, but it is essential that they be provided for. They need protection against the weather and vermin, and a sufficient amount and variety of food.

In the selection and mating of breeding fowls care and judgment are to be exercised, as it is unprofitable to breed inferior stock of any kind. Fowls should be mated early in the season, and in breeding pure stock cocks of other breeds must not be allowed to associate with the breeding hens at any time. Early hatching is desirable, as in the end it is always the most profitable. There is a good market for pure-bred fowls of all the useful sorts for stock purposes, and there will always be a fair margin of profit for the competent breeder. In every case in-and-in breeding must be avoided, for it soon deteriorates the vigor and usefulness of the strains.

The successful rearing of poultry involves much routine and attention to small details. The hen and her brood must be placed in a coop and properly looked after. The coop should be in a sheltered place, and near a grass-run when possible. The dam is confined to the coop, and the chickens are allowed to go out and in at will. The best food for the chicks for the first few days is hard-boiled eggs grated fine, mixed with bread-crumb, and moistened with sweet milk. This is gradually changed to more common food, and at the end of a week cracked corn, whole wheat, barley, or buckwheat may be gradually allowed, and after the tenth day may be substituted as the food, in connection with a little sweet milk. The young birds need frequent feeding. Wet, sloppy, or pasty food should not be given to young chickens. As they grow older—say at the age of three weeks—the hen may be allowed to go abroad with her brood. Good feeding is always advisable for growing chickens, and they must not be draggled in wet grass nor be out in rains.

Diseases of Poultry.—The most serious hindrance to rearing young poultry is the "gapes." It is caused by entozoic worms in the windpipe of the chicken, which obstruct respiration and cause the bird to gasp or gape for breath; whence the name of the disease. On infested grounds the disease is very troublesome and destructive. Every henwife has a theory for the cause of the gapes, but the real origin of the gape-worm is unknown. The way to avoid the difficulty is either to hatch the broods in winter, or to establish a sufficiently spacious *chicken-nursery* in which to rear the broods until they are weaned, after which there is less danger from the parasite. There must be plenty of dry open shedding in the nursery, some of it preferably covered with glass. All other fowls except the dams are to be rigidly excluded from the nursery, and the chicks must be confined within it. The coops and all utensils must be kept scrupulously clean. The general enclosure should be large enough to furnish some cultivated crops for green food for the young things confined to the nursery, where they should remain until they are six weeks or two months old, when they may be removed and colonized in suitable quarters. Every dam and her brood must be thoroughly cleared of vermin before being placed in the nursery. This is most easily done by carefully anointing them with a preparation made of an ounce of crystallized carbolic acid mixed with a pound of melted lard. A free use of carbolic acid or carbolate of lime about the coops, and an occasional dusting of the broods with Egyptian powder or pulverized pyrethrum ("Persian insect-powder"), will keep the young poultry clear of vermin of every kind. Such management, with proper feeding and protection against enemies like rats, cats, crows, hawks, etc., very much reduces the difficulty of rearing young poultry.

Other diseases attacking both young and adult poultry are roup and cholera. The first is an old disease, and has always been known to poultry-keepers. It is caused mainly by undue exposure to damp, cold weather. Pathologically, roup is a malignant catarrhal disease affecting the mucous membrane of the air-passages and the eyes. It is caused at first by the fowls taking cold, and progresses to the malignant stage, when it destroys the fowl. Stock weakened by vicious in-and-in breeding, or having weakened constitutions from any cause, are most likely to be attacked by roup. Careful breeding, the introduction every second year of fresh healthy blood, comfortable housing, cleanliness, the destruction of vermin, and proper feeding, will avoid trouble from roup.

Poultry cholera is a comparatively new disease; it was unknown in this country until 1867. It baffled and frightened both fanciers and ordinary poultry-keepers for some time, but is now well understood. Dr. A. M. Dickie, of Doylestown, Pa., made a careful study of the epidemic in 1873–74. He diagnosed the disease as zymotic in character, and as being caused by an organic germ introduced into the circulation through the food, drink, and respiratory act, but did not detect the germ. Pasteur, of Paris, in 1880 discovered, figured, and described the bacterium that causes the blood-poisoning, thus substantially confirming the results of Dickie's labors. Though still formidable and destructive in some sections, poultry cholera is much less so than when it first appeared. Upon the discovery of the very first symptoms of the malady prompt action must be taken, and the whole flock treated as if they had the cholera. Affected birds are to be isolated at once, and treated with a preparation of dissolved sulphate of iron, to which has been added a slight excess of sulphuric acid. This is to be administered in soft food, and if the fowl refuses to eat, it is to be put into the mouth and pushed into the crop with the finger, a few drops of the solution being poured down the throat at the same time. The poultry quarters and runs are to be copiously sprinkled with water acidulated with sulphuric acid, and the droppings of the birds drenched with the same. The whole premises may afterwards be sprayed with water slightly impregnated with carbolic acid, thus destroying the germs that cause the disease, which is preferable to Pasteur's method of vaccination in unskilled hands.

Poultry-Keeping as a Business.—Poultry-keeping, after a fashion, is common throughout the country, but the majority of successful poultry-keepers are villagers, persons occupying small holdings, and laborers. On their small places by far the greater number of eggs are produced, and even most of the market poultry, exclusive of turkeys and geese. In small establishments it is more profitable to produce eggs than flesh, and fowls are often kept only for the sake of the eggs. There is a difference in the laying qualities of breeds. The spare-built, close-feathered ones are the best layers, while the bulky Dorkings, Asiatics, and their crosses are the best to rear for their flesh. The recognized laying breeds are the Hamburgs, Leghorns, Polish, and French. These all lay pure white eggs of good size and quality, the Hamburg eggs being the smallest, and the white-faced Spanish and Houdan the largest. The eggs of the so-called small breeds average as large as those of the Asiatics. These last and their crosses all lay brownish-colored eggs, which popular opinion has erroneously rated as of a better quality than the white eggs. There is no difference in the quality of eggs produced by different breeds with the same food and treatment; but the size, number, and quality of the eggs of any breed will vary with the food and care the fowls get. The laying breeds produce each an average of 150 eggs per annum, whereas the large or meaty breeds yield about 100 each. The smaller breeds are therefore to be selected where eggs are mainly wanted, the large breeds where flesh is required, and a medium-sized fowl, a cross between the large and the small, where both are desirable. It is usually preferable to keep pure breeds, but from the practical standpoint judicious crosses are always advantageous. In ordinary cases one cock is enough for twenty-five or thirty hens, but it is different where eggs are wanted for hatching. Then one cock should not have more than five to eight hens, unless on an unlimited run; and even then there should not be more than ten or twelve hens in one harem. If the breeding-stock is properly selected and given sufficient room and care, the eggs will all be fertile and the chicks strong and healthy. Disappointment is often experienced with eggs laid by hens closely confined and insufficiently supplied with green food.

Laying hens must be properly fed. Though a simple problem, this is by no means an easy one. Corn is the staple food of all poultry in this country, and, while it is the best for some purposes, it is not a good staple food for laying hens, being too heating and fattening. Good oats, barley, buckwheat, and wheat, all of which are richer in albuminoids, are better food for laying hens than corn. When practicable, the smaller grains should be alternated with corn and with one another. The early morning meal must be soft food, cooked or scalded. It may consist of any of the above grains, ground and mixed, half and half, with good sound wheat-bran, fed moderately warm, and in sufficient quantity to satisfy the fowls, but to that extent only. Fresh, clean water must be supplied at feeding-time, and calcareous matter, that the hens may get lime for the wants of the organism and to form the shells of the eggs. This lime-supply is important, and may be found cheaply in crushed oyster-shells. The birds may have a light feed of whole small grain at noon, and a more liberal one at evening. In winter the latter food may be whole corn. Green food and animal food in some form are necessary; the former may be supplied in the form of grass, cabbage, lettuce, cooked vegetables, etc.; the latter in sour milk when it can be had, offal meat from the butcher, and greaves from the tallow-chandler. All scraps and odds and ends from the table and kitchen should go to the fowls. Laying hens in confinement must be furnished with employment to divert them, or they will contract bad habits, as feather-plucking, egg-eating, and other mischief. They may be employed in searching for a part of their food, which has been hidden in a rubbish-pile or in the straw and litter of their quarters. Whole or broken grain, broken oyster-shells, small table-scraps, and the like may be thus secreted. A fresh sod or turf thrown into their quarters daily affords the hens much profitable amusement.

The cost of keeping a hen from the time she is hatched until she should be killed and eaten is about $2, if all her food is bought and fed to her in a confined run. The profit on this expenditure will depend upon the time at which the hen is hatched. If hatched in March or early April, she will begin to lay at about six months of age; if in June or July, she will not, under ordinary circumstances, lay until nine months old. From the economic standpoint, the hen should be hatched at least as early as April 1st, and be killed at sixteen or seventeen months old, when she is ready to moult. She is then to be disposed of, and her place filled with a six-months' old pullet ready to begin laying; thus no food and care are wasted. Most of the unsatisfactory results in poultry-keeping are traceable to a lack of knowledge in feeding, and to keeping birds that make no return for the care and food given.

As a source of food-supply eggs and poultry fill an important place. Statistics are difficult to get at, but from such as are available some idea of the poultry-products of the nation may be gained. The egg-trade of New York City, as shown by the reports of the Produce Exchange, amounts to between $8,000,000 and $9,000,000 a year. In Boston the trade is a little more than one-third as much, and in Philadelphia it is a little above two-thirds as much. The total for the egg-trade of the three cities is, in round numbers, $16,000,000 per annum. The trade in poultry is equal in value to that in eggs. Allowing the trade in these three cities to represent one-fourth of the total aggregate trade of the country at large, there is at least the enormous total of $130,000,000 worth of food-products derived from the poultry-yards of the nation. The industry is largely on the increase; new and systematic methods are being introduced and adopted. Improvements in artificial hatching and rearing are opening the door for an almost unlimited extension in the production of poultry. The canning industry, too, opens a vista of magnificent possibilities, and assures a poultry dinner anywhere on land or sea at any time of year. The cold-storage methods also open a new door for the poultry-keeper. When poultry and poultry-products are promoted to a place in the census reports the public will have a better chance to understand and appreciate the business.

Poultry-keeping will soon be attempted here, as it has been abroad, on a large scale (poultry-farming), and, let us hope, with success. The outlook for such an enterprise in competent hands is favorable. But as regards the increase of poultry-production, taken as a whole, in this country, less is to be expected from poultry-farming, pure and simple, than from the gradual growth of interest in the business on the part of ordinary farmers and poultry-keepers; and it will not be long until the Americans will equal the French as a nation of poultry-producers, consumers, and exporters.

Poultry-culture is largely assisted and stimulated by the literature pertaining to the subject. The first poultry periodical published in the world was issued in New York in 1869, under the title of *The Poultry, Pigeon, and Pet-Stock Bulletin.* This pioneer effort has been followed by the publication of a number of similar journals in America, Canada, and England. Most of these periodicals are fairly well conducted and supported. Besides these, every leading newspaper, religious, secular, and agricultural, gives some attention to poultry topics. The most comprehensive and excellent work on the subject is *The Book of Poultry*, edited by L. Wright (London, 1875). This exhaustive work is illustrated with fifty colored plates and numerous wood-engravings. There are books on poultry published in America, but none of them equal in value and authority to the one just named. (A. M. D.)

FOWLER, CHARLES HENRY, an American bishop, was born in Upper Canada in 1837, but his parents removed to the United States in 1840. He graduated at Genesee College in 1859, and studied theology at Evanston, Ill. He entered the itinerant ministry in 1872, serving churches in Chicago until 1872, when he was made president of the North-western University at Evanston. In 1876 he was appointed editor of the New York *Christian Advocate*, and in 1880 general misssonary secretary of the M. E. Church. In 1884 he was chosen bishop, his residence being fixed at Atlanta. He has been highly esteemed as a pulpit orator.

FOWLER, ORSON SQUIRE, an American phrenologist and lecturer, was born at Cohocton, Steuben co., N. Y., Oct. 11, 1809. He graduated at Amherst College in 1834, and with his brother, Lorenzo Niles (born June 23, 1811), began the advocacy of phrenology and various projects for the promotion of education, health, and social reform. They wrote and published many books on these subjects. In 1863 they retired from publishing, Orson going to Boston and Lorenzo to England, but both continued to write and lecture on their favorite subjects.

See Vol. IX. p. 435 Am. ed. (p. 493 Edin. ed.)

FOX. The dog family (*Canidæ*) may be divided into two series, one containing the dog-like, the other the fox-like forms. Certain cranial peculiarities characterize the foxes. The frontal bones are without the hollow or sinus found in the true dogs, and the cerebral hemispheres, instead of widening out abruptly a little behind their junction with the olfactory lobes, are narrow in front, being shaped like a pear with the narrow end forwards. The fennec of Africa is ranged with the foxes, which, besides the structural peculiarities noted, are distinguished by their bushy tail, elongated muzzle and pupils, and erect ears.

Besides the common red fox (*Vulpes fulvus*), which is very near to the European fox, and branches into several varieties, there are several other more or less distinct species of fox in North America. One of these is the gray fox (*V. cinereo argentatus*) which is distributed throughout the United States. The hair of this species is stiff, coarse, and long, of a mixed silver-gray tint, or hoary and black, not unlike that of the badger, but darker. Black predominates on the upper surfaces of body and tail, while the underparts of the body are pale cinnamon, and the underside of the tail chestnut. The gray fox has a power of climbing trees not possessed by the red species, and is thus better adapted for a wooded region. The felling of the forests, combined with its lower brain-power as compared with the red fox, seems to cause it to give way to the latter in the more settled and cultivated districts. The bones of this fox have been exhumed from the caves of Pennsylvania, and thus it seems to be the aboriginal species.

Allied to the gray fox, and very possibly but a geographical variety of it, is the coast fox (*V. littoralis*) of the islands off the Pacific coast of North America from California to Costa Rica. This form is scarcely more than half the size of the gray fox, and has short, weak, slender legs, causing it to be a poor runner. The tail is about one-third the length of the body, and has a black stripe above. Black predominates also on the chin, sides of the muzzle, and back. Both these forms have small teeth and weak jaws, and are among the lowest of the foxes.

The silver fox or black fox, in which the fur is black, with the hairs of much of the back ringed with gray; the cross fox, which has a dark band between the shoulders, crossed by another passing over the shoulders, and the long-tailed fox (*V. macrurus*) of Utah, are all varieties of the common red fox.

Among the characters which distinguish this fox from the common fox of Europe (*V. vulgaris*) are a greater fineness of fur, a brighter color, and a narrower and more delicate head. The red fox will eat crabs or fish when near the seashore, and feed on crickets or carrion when hard pressed for food.

In Central North America, from the Cascade Mountains of Oregon to the timbered lands of the Lower Missouri, the kit fox, swift fox, or burrowing fox (*V. velox*), a small species about twenty inches in length without the tail, is common. In the basin of the Upper Columbia it seems to be the prevailing species, but is not on record north of the Saskatchewan. The face is broader and the nose shorter than that of the red fox. In color it is brownish gray, becoming reddish orange on the breast and flanks and fading to white below. The soles of the feet are covered with long woolly hair, hiding the callosities. In winter the fur is pale grayish-brown. It lives in holes in the ground, and is a dexterous burrower.

The well-known and beautiful little Arctic fox is another North American species. Among foreign species, besides the notorious European fox, may be mentioned the caama or asse (*V. caama*) of South Africa, which feeds largely upon the eggs of such birds as lay on the ground; the kokree or Bengal dog (*V. bengalensis*), the corsac or adive (*V. corsac*) of Tartary, Siberia, and other parts of Central Asia; the sobona or tahaleb (*V. niloticus*) of North Africa and Egypt; the canduc (*V. adusta*) of Caffraria and other parts of South Africa; the Cape jackal or tenlie, which ranges from Abyssinia to the Cape; the Persian fox (*V. flavescens*), found also in India; the hill fox of Nepal and Thibet (*V. montana*), *V. japonica* from Japan, and *V. cana* from Beluchistan.

The corsac was in the reign of Charles IX. kept as a pet by the fashionable Parisian ladies. Col. Prejevalsky states that it is abundant in Thibet, and is called karsa by the Mongols. It makes its own burrows, and in the breeding season is noted for its hideous cry, like the hooting of an owl.

Another and a rather exceptional species is the fennec (*V. zerda*), a pretty little pale fawn-colored animal, sometimes almost creamy white, and barely a foot in length without its tail, which has a black tip. The eyes are blue, the whiskers long and thick, the ears large and pointed, and the form slender. It lives by day in burrows scooped in the light sandy soil of the deserts of Northern Africa. It makes an admirable pet. The fennec is said to be able to climb the date palm for dates, of which it is very fond. (W. N. L.)

FOX INDIANS. This tribe belongs to the Algonkin family, and was divided into two branches, the Outagamies, or Foxes proper, and the Musquakink. They were first found by the whites in Canada, near Lake St. John, but were gradually driven westward, and settled on Fox River, Wisconsin, about 1660. Their number was estimated by the Jesuit missionary in 1667 to be 500 warriors. They were excellent hunters, and brave in war, and cultivated Indian corn. At times they were friendly to the French, and again they joined combinations against them. In 1712 they attacked Detroit, but were afterwards severely punished by its commander. As they occupied part of the usual route of the French from Canada to Louisiana, and at times completely obstructed the passage, expeditions were sent against them. In the final struggle between the English and the French for Canada in 1763 the Foxes aided the latter. They resided at Prairie du Chien during the Revolutionary war, and so far as they took part in it they assisted the English. Their kindred the Sacs were involved in the Miami war, 1790–94, but the Foxes remained quiet. In 1804 both these tribes having crossed the Mississippi, ceded their lands to the United States. Some of them afterwards went to Canada and joined the British during the war of 1812, but they made peace in 1815, and gave up their prisoners. Treaties were again made with them in 1824 and 1830, but in 1831 a dispute about Rock Island led to the Black Hawk war. At the close of this war further cessions of land were made by them and they retired to Des Moines, Iowa. Here they gave constant trouble to their Indian neighbors, and in 1842 the United States government removed them to the Osage River. Later the Sacs and Foxes were in Kansas, but in 1859 they ceded their lands and were placed on a reservation between forks of the Canadian and Arkansas Rivers. It covers 483,800 acres, and is partly cultivated. A smaller band occupy a reservation on the boundary between Kansas and Nebraska. Both these branches receive annuities from the United States. Still another band of about 300 settled down in Iowa without aid from the government, and have made progress in agriculture.

FOX, GUSTAVUS VASA (1821–1883), an American naval officer, was born at Saugus, Mass., June 13, 1821. He entered the navy as midshipman in 1838, and served in the coast survey and in the Mexican war. He resigned in 1856, and became agent of a cotton-factory at Lawrence, Mass. Early in 1861 he was engaged in attempts to take supplies and reinforcements from New York to Fort Sumter, but through various delays was prevented from entering Charleston Harbor until after Major Anderson's surrender, when his vessel was used to take the garrison to New York. Fox immediately fitted out a steamer and sailed to the Chesapeake, where he assisted in restoring communication between Washington and the North. He was soon after made assistant secretary of the navy, and his prudence, good sense, and administrative ability were shown in the efficiency and success of that department throughout the war. In April, 1866, being about to resign his office, he was sent on a special mission to St. Petersburg to present to the Emperor Alexander II. congratulations on his escape from assassination. On his return to the United States in September he took charge of large woollen factories at Lowell, Mass. Afterwards he was engaged in business at Boston, where he died, 1883.

See Vol. IX. p. 445 Am. ed. (p. 505 Edin. ed.).

FRANCE. The Republic in France is the condition of all progress, yet its establishment is a work far greater and more difficult than was anticipated by its ardent friends. The old Europe of feudalism cannot at once disappear, the new Europe of the people cannot begin till the Republic is founded. Republicanism means the definite extinction of hereditary claims of every kind, the final admission of capacity and merit to every function in the state. This is the great political problem of modern Europe.

Early in 1879 the republican majority in the French assembly was once more face to face with a reactionary administration. Control of the army was an important subject in the dispute with Marshal MacMahon. It ought not to be of any consequence what are the politics of the commanders of the grand divisions of the French army, nor should it be a point of great moment what party the minister of war sympathizes with. But this point was forced upon the attention of republicans by the marshal's tactics when Gen. Borel was made minister of war. He was formerly chief of staff to Marshal MacMahon. No man of great talent was ever endured in that position. Borel owed his distinction to his readiness to lend himself in every way to any administration of his department that might give effect to his chief's ill will towards the Republic and the republicans. Moved by the facts of such an administration of the army the republicans made some demands. They asked for the removal of certain Bonapartist generals. But the very denial of their demand and the persistence in this denial assured them that the facts in the army to which they objected were not accidental, and the policy against which they had to strive was the same in nature as that of the De Broglie ministry; it was an attempt to govern without the majority. On Jan. 30, 1879, MacMahon being defeated in this attempt found himself at last compelled to resign. M. Jules Grévy was then elected president of the French Republic and Gambetta became president of the French assembly.

Gambetta had he chosen might have secured the presidency as the marshal's successor. But with that keen and wise foresight for which he was remarkable he saw that the time was not yet ripe. It is useless, perhaps, to ask where and when Léon Gambetta learned the arts of government and war. The fact remains that in the terrible crisis of 1870 an unknown, penniless lawyer of thirty-two became at once the absolute dictator of France, roused her from her slumber, upheld her banner against hopeless odds; he himself organized the army of the Loire, the only army which won a victory in that gloomy period of war with Prussia; he made the French people feel again they were a people and impressed on their hearts the image of Republic instead of the Empire. He alone gathered the discordant factions of the republican party into a compact and harmonious body. He restrained or let loose the ardor of his followers at will, each at the moment when the restraint or when the display would be most effective for the end in view. The Republic, as it is to-day, owes its very existence to Gambetta; to his audacity in 1868; to his resolution in 1870; to his sagacity in 1877. His mysterious death on Dec. 31, 1882, was to France what the death of Cavour was for Italy; what the death of Bismarck will be to Germany.

The death of the Prince Louis Napoleon, son of Napoleon III., on June 1, 1879, showed once more that the Bonapartists had no influence on the popular mind, and in spite of their combined attack with the non-compromising Left Centre and the Orleanists the ministry had no difficulty in pursuing its policy of non-intervention.

Meanwhile a sensation was created by Jules Ferry, the head of the ministry, in September, 1880. He put into vigorous operation the dormant law for the expulsion of the Jesuits from France. At the time the chambers adjourned for the Easter holidays it was announced that the contemplated decrees in reference to "unauthorized congregations" would appear in the official journal at once; but this publication was deferred after Easter, in order that a holy season, recognized by the whole Christian world, might not be disturbed by what is very apt to be called an assault upon religion. In discrediting the republican theory and in fighting the Republic in every way the Jesuits have distinguished themselves. Their open battle with the Republic on article 7 made a dangerous exhibition of their power. They were therefore expelled, and M. A. Ferry received credit for his tact and patience in that hazardous undertaking, in which he gave no chance to the enemies of the French Republic to raise the cry of persecution.

Despite many disappointing circumstances the French colonies have gained much by the substitution of a Republic for monarchy, and in regard to the new policy a few details are necessary. At the commencement of April, 1881, the expedition sent to explore the Sahara was entirely annihilated by a tribe called Kroumir, who crossed the Tunisian frontier and went back to their wilderness. M. Roustan, then French consul at Tunis, acted with uncommon vigor, and demanded redress of this hostile conduct. When no satisfaction was received from the bey, the General Forgemol at the head of 30,000 men invaded the Tunisian country and soon completed its conquest.

In addition to the advantages of general topography Tunis possesses an important condition of natural wealth, in having the finest position of North Africa and the control of the Mediterranean. Hence arise its attractions for the powers which strive for its possession or for its neutralization. It has an area of 60,000 square miles and a coast line of 550 miles. Its closeness to the interior of Africa made it once the most important market and commercial country of the African continent, and under favorable circumstances it might again become distinguished for its commerce. Such are the privileges which, with its admirable maritime position, necessarily predestined Tunis for long and glorious annals. The French Republic organized a regency in Tunis, March 30, 1882, which has since conducted the government of the province without serious difficulty.

The French and Tonquin war was occasioned by the alleged encroachments of the so-called "Black Flags" upon the foreigner and specially the Christians. A French fleet went up the Min River. A temporary panic in Southern China ensued and a popular uprising was felt, but this alarm soon passed away. The fleet under Rear Admiral Courbet subdued the Black Flags, and his triumph was peculiar and almost unexpected. A treaty was made with China giving to France the protectorate of that province, which is now under the control of M. Paul Bert as governor.

The French have also been active in Madagascar, where for the last 200 years they have had considerable influence. Here trouble broke out with the Hovas, the most intelligent and energetic of its numerous tribes, and troops were sent to protect the foreigners. Although Madagascar is known to be the third largest island in the world its actual condition is not very generally understood. Its importance may be fairly estimated by its size, it being nearly 1000 miles long by about 250 in average breadth, and reaching to 350 miles at its widest part. A barrier reef of coral extends from 200 to 300 miles along the south-east coast. There is a vast extent of country on the coast plains where the soil is most fertile, but which is only thinly peopled. At the present time this vast island is of peculiar interest to the world by a series of political changes. The Hovas have gradually obtained the supremacy over all the other tribes. The central province of Imerina occupied by them, and especially its capital city of Antananarivo, has been for several years past a centre of intelligence, civilization, and Christianity. During the recent war the foreigners suffered no serious disturbance, and the treaty of Dec. 17, 1885, restored to France her former influence in that country.

The several changes of the ministry have not disturbed the harmony and permanency of the actual government. It has carried on a judicious policy of colonization and has conducted successful though expensive campaigns in Tunis, Tonquin, and Madagascar. M. Grévy, the model chief of the Republic, has become more than ever a favorite with the people.

"The monarchy is dead, but the country is living," said Victor Hugo, shortly before his lamented death. The life of this greatest of all French romancers was itself a romance. We cannot here trace its vicissitudes and triumphs. The world will remember that vast ceremony in Paris on June 1, 1885, such a funeral as no emperor ever had, when all France helped to bury the one Frenchman who loved France with a fervor more than patriotic.

Now, despite the vacillation and hesitancy of the ministry for which M. de Freycinet was so severely blamed, in September, 1880, in following the policy of compromise and of non-intervention in the case of Egypt, the government headed by M. Grévy, whose public conduct is so strongly impressed by the importance and necessities of the existing state of French politics, has a firm foundation. The Republic is no longer a dream, no longer an experiment. It is a living reality, a powerful factor in the world's history. Its foundations have been sunk deep in the national character. It is upheld by the hearts, the voices, and the arms of millions. When M. Grévy's first term of seven years was drawing to a close he was, in December, 1885, elected for a second term. He has acted with decision, making no mistakes serious enough to be acknowledged, and giving his enemies no time to construct mines beneath his outworks. His political rule of life is touchingly simple; he believes in equal rights to all, political, social, and industrial, as the ultimate aim of good government.

Statistics.—By the census taken Dec. 18, 1881, the population of France was 37,672,048, and its area 204,177 square miles, giving the ratio 184 inhabitants to a square mile, but in the department of the Seine (Paris) it is 14,670, and in the Basses-Alpes 49. The population present numbered 37,405,290, of whom 18,656,518 were males and 18,748,772 females, the excess of the latter being less than in any other state of Western Europe. The number of families was 10,399,885, and there were 7,609,464 dwelling-houses, containing 10,720,826 apartments. France is divided into 87 departments, which are subdivided into 362 arrondissements, 2865 cantons, and (in 1883) 36,097 communes. The stationary character of the French people is shown by the fact that of the total population 22,702,356 were born within their communes. There were 1,001,900 foreigners residing in the country, and 77,046 naturalized. The total emigration (exclusive of Algeria) was 4456. According to occupation the population was divided as follows:

Agriculture	18,249,209	Public forces	552,851
Trades and manufacture	9,324,107	Living on income.	2,121,173
Commerce	3,843,447	Without occupation	737,088
Professions	1,585,358	Occupation unknown	191,316
Transportation	800,741		

The agricultural population was classed as follows: farming proprietors, 2,425,500; farmers, 1,010,999; small proprietors working for others, 772,339; foresters, 112,200; employés and domestics, 3,535,040; families of preceding, 10,393,131. The following 10 cities had each over 100,000 inhabitants:

Paris	2,239,928	Toulouse	140,289
Lyons	376,613	Nantes	124,319
Bordeaux	360,099	St. Etienne	123,813
Marseilles	221,305	Rouen	105,906
Lille	178,144	Havre	105,867

In 1884 there were 10,204,228 persons having the right to vote; in 1881 there were 6,944,531 who actually voted. In the chamber of deputies there are 557 members; in the senate 300, of whom 75 originally held their seats for life, but in 1884 it was enacted that vacancies in the life-senatorships should be filled as they arose by election for the usual term of 9 years.

The revenues and expenditures since 1880 have been as follows in francs:

	Revenue.	Expenditure.
1880	3,530,823,284	3,364,577,723
1881	3,689,409,797	3,582,416,373
1882	3,654,263,289	3,684,677,369
1883	3,668,353,016	3,714,478,125
1884	3,354,785,178	3,385,409,496

The total debt in 1885 was 19,656,045,076 francs, on which the interest was 706,116,867 francs. (P. C.)

FRANCHISE, a special privilege conferred by the government of a country upon an individual or body of individuals, which does not belong to the citizens of the country generally of common right. In England franchises were anciently granted by the crown and in modern times by authority of Parliament. In the United States franchises can only be granted by the legislature or by some other branch of the government by virtue of legislative authority.

Franchises are generally granted for a public or at least quasi-public use. The various rights conferred upon different classes of corporations are franchises. The right to erect and maintain a ferry, a bridge, or a turnpike road is in like manner a franchise. According to the ancient rule of the common law the obligation existing between the government and the person holding a franchise was mutual. It was the duty of the latter to furnish to the public all the facilities which the nature of the franchise granted to him called for. The owner of a ferry was, therefore, bound to continue to run his boats and the owner of a toll bridge to keep the same open and in repair. The penalty for failing to do this was forfeiture of the franchise. This is still the law.

On the other hand the government was anciently held bound not to grant to other parties franchises in conflict with those previously granted. In the United States this doctrine has not been distinctly repudiated, but the principle has been laid down that the grant of a franchise will always be construed strictly against the grantee. Hence the exclusive nature of a franchise will not be inferred unless expressed in terms.

The grant of franchises by the government when accepted and acted on by the party are within the purview of the constitutional prohibition of the impairment of contracts. The grant by the government on the one hand and its acceptance on the other are deemed to constitute a binding contract which the legislature cannot subsequently repudiate by withdrawing the franchise conferred. Where the charter conferring the franchise, however, contains a clause reserving to the legislature the right to annul or vary the franchise granted, or where the charter is granted subject to a constitutional provision or general act reserving to the legislature such a power, it may constitutionally be exercised.

Franchises are not alienable by the owner or owners thereof without express legislative authority. They cannot, therefore, be conveyed or mortgaged of common right. They cannot be taken in execution and sold so as to convey any title to the purchaser.

Elective Franchise.—In the United States the term "franchise" is commonly used as synonymous with "elective franchise." It indicates the right to vote at elections on matters ordinarily submitted to the people. All persons who are citizens are not necessarily invested with the franchise. It is a special privilege conferred upon certain individuals among the citizens of the country.

The Constitution of the United States as originally adopted does not contain any provisions as to who shall have the privilege of the franchise, but leaves the matter entirely to be determined by the laws of the several States. The fourteenth amendment to the Constitution provides that whenever by the law of any State the right of voting is denied to any male inhabitant over twenty-one years of age except for participation in rebellion or other crime, the basis of representation in the House of Representatives shall be reduced proportionally. The fifteenth amendment to the Constitution provides that the right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude. This amendment does not take away from the various States the right of determining the qualifications of electors. It merely prohibits them from discriminating against parties for any of the causes specified.

The provision of the fourteenth amendment to the Constitution prohibiting the States from making laws abridging the privileges or immunities of citizens of the United States has been construed not to confer the privilege of the franchise upon any one. The right of citizenship and the right to vote are separate and distinct. The guarantee of one right does not in any way refer to the other.

In the early colonial days of the United States the right to exercise the franchise was very limited. There were numerous religious and property qualifications which it was requisite that a voter should possess.

At the time of the adoption of the Constitution the laws of almost every State conferred the right of exercising the elective franchise to citizens who were the owners of a certain amount of property. Such were the express provisions of the laws in Massachusetts, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia. In New Hampshire each male inhabitant who was of age and possessed of town privileges, excepting paupers and persons excused from paying taxes at their own request, was entitled to vote. In Rhode Island "such as were admitted free of the company and society" of the colony. In Pennsylvania all freemen who had lived for two years in the State, and who had paid a State or county tax assessed six months before the election in question.

Since the adoption of the Constitution the laws have been so altered in the various States as to admit to the privilege of the elective franchise all male citizens of the United States who have attained lawful age. In the Territory of Wyoming since 1869, women also have been permitted to exercise the elective franchise.

Residence within the State and election district for a certain specified time before the election, and the payment of a State or county tax within another certain specified time, are by law generally made prerequisites to the right to vote. In some States disability to vote for a limited period is an additional penalty imposed by law upon conviction of certain classes of crime. (See ELECTION LAWS.) (L. L., JR.)

FRANCIS, JOHN WAKEFIELD (1789–1861), an American physician, was born in New York city, Nov. 17, 1789. In early youth he learned printing, but afterwards entered Columbia College. Graduating in 1809, he studied medicine at the College of Physicians and Surgeons, and in 1811 received his medical degree, being the first conferred by that college. He became partner with his preceptor, Dr. Hosack. In 1813 he was made professor of materia medica in Columbia College, and in 1816 went to Europe, where he studied under Dr. Abernethy. After his return he held the chairs of the institutes of medicine, medical jurisprudence (1817), and obstetrics (1819) until 1826, when he withdrew with others of the faculty to form the Rutgers Medical School, in which he was professor of obstetrics and forensic medicine until the college was closed in 1830. Dr. Francis then devoted himself to professional, literary, and reformatory work. He published many professional, scientific, and biographical sketches. His latest work was *Old New York, or Reminiscences of the Past Sixty Years* (1857; new ed., 1865). He died Feb. 8, 1861.

FRANCIS JOSEPH, Emperor of Austria and King of Hungary, was born Aug. 18, 1830, being the son of Archduke Francis Charles (1802–1878) and of the Princess Sophia (1805–1872). He ascended the throne Dec. 2, 1849, on the abdication of his uncle Ferdinand. The war in Hungary had shaken the foundations of the empire. Although at the outset he promised a constitutional government, he soon found himself compelled to assume absolute power to prevent the dissolution of the empire. In Hungary, by the intervention of Russia, the republic established by Kossuth was overthrown. In Italy the military skill of Radetsky restored the Austrian supremacy. When order was thus established in his dominions, Francis promulgated the edict of Schönbrunn, Sept. 26, 1851, declaring the government responsible only to the emperor. A policy of centralization was enforced, while much attention was given to financial matters and to commercial reforms. During the Crimean war Austria remained neutral, and, though this policy was dictated by good reasons, she thereby incurred the displeasure of France. Napoleon III. at the earliest possible moment took his revenge by carrying the war into Italy. Lombardy was wrested from Austria, but the peace of Villafranca, July 8, 1859, stopped the advance of the French army, and left Venetia still under Austrian control. By the march of events and the force of public opinion the emperor was obliged to recede from his autocratic pretensions. First he enlarged the Reichsrath, and in 1862 he admitted the principle of the responsibility of the ministry. In 1864 Austria joined with Prussia in enforcing against Denmark the German claim to Schleswig-Holstein. But though these powers were thus banded together for a time, their divergent interests soon forced them apart. Napoleon III. fomented their jealousies, hoping to profit by their quarrel. On the other hand Francis Joseph had been able to conciliate to a remarkable extent the people of Hungary, and when war came in 1866 that kingdom proved the most loyal of his dominions. Although the best generals and troops of Austria had been marshalled on its northern borders in readiness for war, the skill and strategy of Von Moltke overthrew them in a few weeks. On the bloody field of Sadowa the superiority of the needle-gun was demonstrated for the first time. Count Beust, who had been prime minister of Saxony, now held that place in Francis Joseph's councils, and by his advice peace was promptly made. In recognition of the loyalty of Hungary in this time of trial, the emperor proceeded to Pesth and was formally crowned King of Hungary June 8, 1867. In a few years Count Bismarck found means to attract Francis Joseph, and in 1871 there was a friendly meeting of the two emperors, Francis Joseph and Wilhelm, at Gastein. In the next year the Czar of Russia met with the other two, and since that time there have been other interviews of the three emperors. These meetings seem to have had the effect of restraining the propensity to war on the part of their nations, though the condition of Turkey has been a constant incentive in that direction. The Congress of Berlin in 1880 revised the terms of the treaty of San Stefano and gave Austria a proper share in the territory taken from Turkey.

The Emperor Francis Joseph is tall and handsome. He is well educated, and in the Italian war was conspicuous by his bravery. He married, April 24, 1854, Elizabeth Amelia Eugenia, daughter of Duke Maximilian Joseph of Bavaria. They have one son, Archduke Rudolph (born Aug. 21, 1858), and three daughters.

FRANKFORT, a city, the capital of Kentucky and of Franklin county, is on both banks of the navigable Kentucky River, here crossed by a railroad and a highway bridge, 65 miles E. of Louisville. It is on the Louisville, Cincinnati, and Lexington Railroad. It is regularly laid out on a plain surrounded by hills, has public gas and water supply. The principal public buildings are the State capitol, the United States customhouse, State prison, and the other city, county, and State buildings. Among its institutions is the State school for feeble-minded children. Frankfort has 3 banks, 8 churches, and several schools, public, private, and parochial. It has manufactures of flour, hemp, spirits, machinery, and lumber; hard-wood timber being a leading article in the local trade. Tax valuation, $2,271,011; public debt, $146,076. Frankfort was settled in 1786, and became the State capital in 1792. Population in 1850, 3308; in 1860, 3702; in 1870, 5396; in 1880, 6958.

FRANKING PRIVILEGE. When the importance and independence of the British Parliament increased during the seventeenth century, its members obtained by favor of the crown the privilege of sending and receiving mail-matter free of charge. The abuses which grew around this practice, while the rates of postage were high, led to its formal recognition and regulation by act of Parliament in 1764. In America, after the declaration of independence, the Continental Congress conferred on its members while in actual attendance the same privilege for communications on public service. Certain civil and military officers also had this privilege, and army officers in actual service were allowed to send and receive single letters free of charge.

When the United States Post-Office was fully organized in 1792, the franking privilege was granted to the president, vice-president, the secretaries of state, treasury, and war, and certain of their assistants, the postmaster-general and his assistants, and the commissioners for settling the accounts of the individual States. The privilege was also granted to all members of Congress, to the secretary of the Senate, and the clerk of the House, during actual attendance in any session of Congress and for twenty days after. No person was allowed to frank or enclose any letter or packet not his own. Any enclosure to such a one for other persons was to be delivered to the post-office that postage might be charged. Under regulations of the postmaster-general newspaper publishers were allowed to send single copies of their papers to any other publisher free of charge. The franking privilege was afterwards extended to delegates to Congress from the Territories, to the cabinet officers, subsequently created, to ex-presidents and to their widows during life. In 1810 the list of franking officers was revised, and postmasters were allowed to send and receive without charge letters not exceeding ½ oz. in weight. All persons having franking power were allowed to receive newspapers free of postage. Members of Congress were allowed to transmit the president's message and its accompanying documents within the year of their issue. Afterwards all executive documents were allowed to be so sent without limit of time. In 1825, when the post-office laws were revised and re-enacted, the time of franking for members of Congress was extended to 60 days before and after any session of that body, but the weight of letters and packets was limited to 2 oz., and provision was made for payment of postage on the excess.

In the revision of the post-office laws by the act of March 3, 1845, the franking privilege was restricted to senators, members of Congress, delegates, secretary of the Senate, and clerk of the House, during each session of Congress and for 30 days before and after. On the excess in weight above 2 oz. of any package postage was to be charged and paid for out of the contingent fund of the Senate or House. Yet members were allowed to frank their own letters throughout the year. Offices of the government who formerly had the franking privilege were to be paid quarterly all postage on official letters and packages received by mail, but the president, ex-presidents, and widows of former presidents were still allowed to have the franking privilege. By the act of March 3, 1847, an annual appropriation of $200,000 was made for the transportation of mail matter of Congress and the departments of the government. In 1851 this appropriation was increased to $500,000, but probably did not cover the actual expense of transportation of the matter franked. Public documents, printed in excess of any possible demand, burdened the mails from Washington. The franking privilege was granted in 1854 to the superintendent of the coast survey, and in 1855 for life to any person who had held the office of vice-president. Publications required by law to be deposited in the library of Congress were allowed to be sent free of postage. By the act of March 3, 1863, the list of those having the franking privilege was again revised. It was limited to the chief officers of the government, but heads of bureaus, chief clerks of the executive departments, and postmasters could use it for official communications, which were to be placed in envelopes marked "Official" with the signature of the officer thereon. Fraudulent use of such envelopes involved a penalty of $300. The franking privilege was limited to packages not exceeding 4 oz. in weight, except petitions to Congress, and congressional and executive documents. The franking privilege of members of Congress was to begin with the term for which they were elected and continue till the December after its close. They were authorized to frank seeds, roots, etc., subject to regulations of the postmaster-general. In course of time it became common for persons having the franking privilege to use stamps with fac-similes of their signatures, but in 1869 this practice was prohibited. In 1873, in accordance with the repeated recommendations of successive postmaster-generals, the privilege was entirely abolished, the act for this purpose taking effect July 1, 1873. It was provided, however, that official stamps and stamped envelopes should be issued to the several executive departments, being sold at the same prices as stamps of the same value were sold at the post-office. This provision was abolished July 5, 1884, up to which time official stamps representing $8,049,609 had been used. In 1885 millions of such stamps were destroyed by burning in order to close the accounts of the government officers in relation thereto. Instead of these stamps, envelopes with a notice of the penalty incurred by using them except for official purposes, had already been authorized. These are now exclusively used by the various departments of the government. Newspapers are allowed to be carried free of postage in the county in which they are published.

In early times the abuse of the franking privilege was chiefly in the direction of its being used directly or indirectly by persons not authorized to enjoy it. In later times the chief abuse was the overweighting of the mails by the immense amount of printed matter and other articles sent by those who had the privilege and felt no restraint in using it. By them the government mail facilities were often used to do the work properly belonging to express companies. The reduction of the rate of postage and the wide extension of postal service have done away with all excuse for the existence of the privilege. Knowledge of the abuses with which it has always been accompanied will undoubtedly prevent any attempt at its restoration. (J. P. L.)

FRANKL, Ludwig August, Baron, a German poet, was born Feb. 3, 1810, at Chrast, in Bohemia, of Jewish family. He was educated at Prague and Leitomischl, and in 1828 went to Vienna to study medicine. His first collection of historical ballads, *Habsburglied*, appeared in 1832, and was soon followed by *Epische und lyrische Dichtunge* (1833); *Sagen aus dem Morgenlande* (1834); and translations from Moore and Byron. His epics, *Cristoforo Colombo* (1836) and *Don Juan d' Austria* (1846), increased his reputation. He also published translations from the Servian, under the title *Gusle* (1852), and a history of the Jews in Vienna. He was an active journalist. His satirical poem *Der Universität* (1848) had great vogue. Another poem, published anonymously, *Ein Magyaren König* (1850), pleaded the cause of Hungary, and was for a time suppressed by the Austrian government. In 1851 Frankl was made professor of æsthetics in the Vienna Conservatory of Music. In 1856 he went to Jerusalem to found a school, and afterwards gave an account of his journey in *Nach Jerusalem* (1858) and *Aus Ægypten* (1860). In his *Helden und Liederbuch* (1861) many of his minor poems were gathered, while *Der Primator* (1862) was an important addition to his larger poems. The 500th anniversary of the University of Vienna in 1865 gave him another opportunity for satire. His *Gesammelte poetische Werke* were published in 1880, but he has since added a volume or two. In addition to his literary labors Frankl has had charge of an institute for blind children, and in 1873 called at Vienna a congress of instructors of the blind, over which he presided. In February, 1877, the Emperor of Austria conferred on him the title of Baron of Hochwart.

FRANKLAND, Edward, an English chemist, was born Jan. 18, 1825, at Churchtown, Lancashire. He was educated at Lancaster, London, Marbury, and Giessen, and was a pupil of Bunsen and Liebig. In 1851 he was appointed professor of chemistry in Owens College, Manchester, and in 1857 took the chemical professorship in St. Bartholomew's Hospital, London. In the same year he received the Royal Society's gold medal for his brilliant discoveries relating to metallo-organic compounds. In 1863 he was made professor of chemistry in the Royal Institution, and afterwards in the Royal College of Chemistry. In 1871 he became president of the Chemical Society; in 1877 of the Institute of Chemistry. He is the author of important papers on chemical notation, on drainage, on rivers pollution, and a great variety of practical and theoretical questions connected with his specialty. Among his works are *Notes for Chemical Students* (2 vols., 1876); *How to Teach Chemistry; Experimental Researches* 1878); and a *Handbook of Water Analysis* (1880).

FRANKLIN, a city of Pennsylvania, county-seat of Venango county, is on Venango River, near its junction with the Allegheny River, 65 miles (123 by rail) north of Pittsburg. It is on a branch of the New York, Pittsburg, and Ohio Railroad, and on a branch of the Lake Shore Railway. It is also on the main line of the Allegheny Valley Railway. At proper stages of water small steamboats can reach the place. Franklin has a court-house, jail, and city-hall, 1 national and 4 other banks, a daily and 3 weekly newspapers, 12 churches, a flouring-mill, a brush-factory, a foundry, 3 machine-shops, and several oil-refineries, 2 of them of great extent. It is a well-built town, with streets well flagged. It has gas, water-works, and a fine park. It was settled in 1795, and was incorporated as a borough in 1827, and as a city in 1868. Population in 1880, 5010.

FRANKLIN, the county-seat of Williamson co., Tenn., is on Harpeth River, 18 miles south of Nashville. It has a national bank, some manufactories, and a weekly newspaper, and is the seat of Tennessee Female College. During the civil war Gen. Granger, while holding the town with Union troops, defeated Gen. Van Dorn, April 10, 1863. A still more important battle was fought here Nov. 30, 1864, in Gen. J. B. Hood's march on Nashville. Gen. J. M. Schofield, with the Twenty-third corps and other troops amounting to 17,000 men, had been sent back from Atlanta by Gen. W. T. Sherman to reinforce Gen. G. H. Thomas at Nashville. Hood overtook Schofield's corps before his wagon trains had crossed the Harpeth River, which surrounds the town on two sides. Schofield stationed his cavalry on the north bank, to guard the fords above and below the town. His infantry on the south side stretched from river to river, and was protected by breastworks and artillery. Hood attacked the advance guard about 4 P. M., and drove it back in such confusion that the centre of the main line was broken. Entering the gap, the Confederates captured some guns, but by the gallantry of Col. Opdyke were driven back, losing the guns again. The Confederates renewed the assault, but were repulsed with great loss. During the night Schofield crossed the river and reached Nashville. The total Union loss was 2300; that of the Confederates over 5000.

FRANKLIN, William Buel, an American general, was born at York, Pa., Feb. 27, 1823. He graduated at West Point in 1843, standing first in his class, and was engaged in the survey of the Northern lakes. In 1845 he accompanied Gen. Kearny's expedition to the South Pass of the Rocky Mountains. He served on Gen. Taylor's staff at the battle of Buena Vista, and obtained the brevet of first lieutenant. From June, 1848, to February, 1852, he was professor of natural philosophy at West Point, and for a few months held a similar position in the New York City Free Academy. Afterwards he was consulting engineer and inspector of various public works, including the capitol and other government buildings at Washington. In May, 1861, he was made colonel of the Twelfth United States Infantry, and soon after assigned to command of a brigade in Heintzelman's division. At the battle of Bull Run he was in the hottest of the fight. His commission as brigadier-general of volunteers, received in August, was to date from May 17, 1861. When the Army of the Potomac was reorganized in September, he received a division. Having transported his troops to West Point, on York River, he repulsed Gens. Whiting and G. W. Smith, who attempted to prevent his landing, May 8, 1862. He was now appointed to the command of the Sixth army corps, and took part in the operations before Richmond, fighting from June 27 to 30, and covering the retreat to the James River. He was made major-general of volunteers July 4. At the battle of South Mountain, Sept. 14, he stormed Crampton's Gap, and he fought in the battle of Antietam, Sept. 17. In November he was placed in command of the left grand division, and commanded it in the battle of Fredericksburg, Dec. 13. In July, 1863, he was transferred to the department of the Gulf, and he commanded the expedition to Sabine Pass, Texas, in September. In Gen. Banks' Red River expedition Gen. Franklin was second in command, and was wounded at Sabine Cross-roads, April 8, 1864. He was made brevet major-general in the United States army, March 13, 1865, and resigned March 15, 1866. He had become vice-president and consulting engineer of Colt's fire-arm manufacturing company at Hartford, Conn., in November, 1865.

FRANKLINIA, or **Franklin Tree**, excites considerable interest among botanists. It belongs to the genus *Gordonia*, of the natural order *Ternstrœmeriaceæ*, to which the camellia and the tea-plant of China also belong. The allied genus *Stuartia* and *Gordonia* are the only representatives of the order on the American continent. One species, *Gordonia lasianthus*, was discovered in the early part of the last century, and named by Ellis and described by Linnæus in 1767 under this name in honor of James Gordon, a nurseryman near London, who corresponded with John Bartram, and planted many of the seeds Bartram sent to Peter Collinson. In 1760 John Bartram discovered this second species, and William Bartram, in the catalogue of the Botanic Gardens, called it *Franklinia.* It was not however till 1785 that the description necessary to secure priority to the name was given by Humphrey Marshall in his *Arbustum Americanum.* He names it there *Franklinia alatamaha*, and says: "It was first observed by John Bartram when on botanical researches on the Alatamaha River in Georgia in 1760, but was not brought into Pennsylvania till fifteen years after, when his son William, employed in like pursuits, revisited the place where it had been observed, and had the pleasing prospect of beholding it in its native soil, possessed with all its floral charms, and bearing ripe seeds at the same time, some of which he collected and brought home and raised several seeds therefrom. It seems nearly allied to *Gordonia*, to which it has in some late catalogues been joined; but William Bartram, who first introduced it, believing it to be a new genus, has chosen to honor it with the name of that great and distinguished character, Dr. Benjamin Franklin." It proved finally not distinct from *Gordonia.* It is the *Gordonia pubescens* of L'Heritier, a French author; but it has retained the name *Franklinia* as its common appellation. The most remarkable circumstance connected with its history is, that since William Bartram found it, over a hundred years ago, it has been seen in a wild condition by no one; and the general impression is that it no longer exists in a state of nature. It is generally conceded now that species are continually disappearing and others coming into existence to supply the vacant places. Whether the *Franklinia* is a very old species which has finally disappeared, after having perhaps had a very wide distribution, or whether it is a modern species, which has been evolved from the *Gordonia lasianthus*, but did not get the opportunity to spread itself to any great extent before it was swept away, is among the interesting questions still discussed by botanists; many inclining to the idea that it is one of those species which has died in comparative infancy, so far as its native habitat is concerned.

The original trees of William Bartram were living until a few years ago. There are many trees about Philadelphia raised from them, where they are valued as much for their large white and yellow sweet-scented flowers as for the facts connected with the history of the species.

The species called *Gordonia lasianthus* is commonly known as Loblolly Bay, and is a very common plant in the swamps of the maritime portion of the Southern United States. It grows to about 50 feet in height, and 18 inches thick. The bark is used for tanning, though not equal in value to good oak-bark. The timber is useful for furniture, but of no market value in the general timber trade. (T. M.)

FRANZ, **Robert**, a German musical composer, was born at Halle, June 28, 1815. He obtained no instruction in music until he was fourteen years old. After that his passion for it so interfered with his other studies that in 1835 he was placed under the instruction of Schneider at Dessau. In 1837 he returned home and began an earnest study of Bach and other modern composers. He produced a large number of songs, which, from their display of feeling, melody, and originality, obtained wide popularity. Still he pursued his investigation of the works of the great masters, and was very successful in preparing accompaniments for some of the works of Handel, which would otherwise have fallen into neglect. He was organist of a church at Halle, and was very active in the department of church music. He was also professor in the conservatory of music and conducted large concerts. Deafness finally obliged him in 1877 to give up his various positions and to cease from his musical labors.

FRASER, **Alexander Campbell**, a British metaphysician, was born at Ardchattan, Argyllshire, Scotland, Sept. 3, 1819, where his father was parish minister. His mother was a sister of Sir Duncan Campbell, a baronet of the same county. He was educated at the Universities of Glasgow and Edinburgh, and in 1842 gained the university prize for an essay on toleration. He afterwards became the Free Church minister of Cramond. He early devoted himself to literature and philosophy. He took the chair of logic and metaphysics in the Free Church College in 1846, and from 1850 to 1857 edited the *North British Review.* In 1856 he succeeded Sir William Hamilton as professor of logic and metaphysics in the University of Edinburgh, and in 1859 became Dean of the Arts Faculty. Besides many papers on biographical, educational, and philosophical subjects, he has published *Essays in Philosophy* (1856); a *Collected Edition of the Works of Berkeley* (3 vols., 1871), with a *Life of Berkeley*, and some hitherto unpublished writings of the same philosopher in a fourth volume. This work established Dr. Fraser's fame. He afterwards published *Selections from Berkeley* (1874); a *Monograph on Berkeley* (1881); an annotated edition of Locke's *Essay on Human Understanding*, and a small volume entitled *John Locke.*

FRASER, **Charles** (1782–1860), an American painter, was born at Charleston, S. C., Aug. 20, 1782. After studying law for three years he turned to painting. Becoming discouraged, however, he returned to the law, and was admitted to the bar in 1807. In 1818 he resumed his art-studies, and attained success first as a miniature painter and afterwards in other branches.

of art. His productions include the portrait of nearly every distinguished person of his native State, besides historical and domestic scenes and still-life. An exhibition of his works was held in Charleston in 1857, in which there were 313 miniatures and 139 oil-paintings. He also contributed to periodical literature and published *Reminiscences of Charleston.* He died at Charleston, Oct. 5, 1860.

FRASER, James (1818–1885), an English bishop, was born at Prestbury, near Cheltenham, in 1818. He was trained at Bridgenorth and Shrewsbury, and graduated in 1839 from Lincoln College, Oxford. In 1840 he became a fellow of Oriel, and was a tutor there. In 1847 he was appointed rector of Cholderton, Wilts, and in 1860 took the living of Ufton Nervet, near Reading. Alike as a college tutor and as a parish priest he was universally beloved, and proved himself very efficient. He took an active part in the educational movements of his time, and was the author of important government reports on that subject. He also served on a royal commission appointed to examine the condition of women and children employed in agricultural labor. In 1870 he was consecrated bishop of Manchester, and was thereafter diligent and zealous in episcopal work. He was Select Preacher at Oxford in 1872 and 1877. In the midst of his labors he died suddenly, Oct. 22, 1885. His only publications were sermons, charges, and reports.

FREDERICK, a city of Maryland, shire-town of Frederick co., Md., is 45 miles N. N. W. of Washington, D. C., and 61 miles by railway W. by N. of Baltimore. It is on a branch of the Baltimore and Ohio Railroad, the original main line of that road being 3½ miles distant. The city is also the terminus of the Frederick and Pennsylvania Line Railroad, operated with a number of accessory lines as the "Frederick Division" of the Pennsylvania Railroad. This latter road connecting with the Western Maryland Railroad, gives the town a competing railway line to Baltimore. The surrounding country is remarkably fertile and beautiful. In the population of this region there is a large and thrifty element of German descent, the immigration dating from colonial times. Frederick College was founded in 1797 by the State, and is undenominational. The Maryland Institution for Deaf Mutes is a State institution, founded in 1868. The city has 1 daily and 5 weekly newspapers, 4 national banks, other banks, and varied manufactures, leather and flour taking the lead. The city has a large local and distributing trade. The water supply is obtained from mountain-springs. The population in 1880 was 8659.

FREDERICKSBURG, a city of Virginia, in Spottsylvania county, on the right bank of the Rappahannock, at the head of tide, and 100 miles by a tortuous course from its mouth. By the Richmond, Fredericksburg, and Potomac Railroad it is 61 miles N. of Richmond and 55 miles S. S. W. of Washington. The Potomac, Fredericksburg, and Piedmont Railroad (three-foot gauge) extends hence 38 miles westward to Orange, Va. The river here leaves the azoic rock formation of the Piedmont region, passing into the later formation of the tide-water belt; and by its natural fall, supplemented by a dam, affords great water-power, which is utilized in various manufactories. Steamboats ascend the river to this point, though Tappahannock, more than 50 miles below, is the port of entry for the Rappahannock trade. There are churches of all the leading denominations, a national bank, four newspaper offices, and public and private schools.

The town stands at the base and on the lower slope of a high ridge which here limits the river valley. The small town of Falmouth, in Stafford county, is on the opposite bank of the river. The population of the city in 1880 was 5010.

FREDERICKSBURG, Battle of. Gen. Ambrose E. Burnside was, on Nov. 7, 1862, appointed to the command of the Army of the Potomac, superseding Gen. McClellan, who had failed to reap the advantage of his victory at Antietam. Burnside openly declared his inability to command so large an army, but was induced to accept. He divided the army into three grand divisions under Generals Sumner, Hooker, and Franklin, and advanced to Falmouth, opposite Fredericksburg. Had Sumner, who led the van, crossed the Rappahannock at once, he could have seized and held the heights in the rear of the town, but Burnside would not permit the movement. Before he was ready to cross, Lee had massed the Confederate army there and had fortified the heights. Longstreet held the left of the line in the rear of the town and Jackson the right, two miles below, while Stuart's cavalry guarded still farther down. Burnside proposed to cross the river, chiefly with pontoon bridges, in front of Fredericksburg, but although Union batteries severely bombarded the town, sharpshooters who remained were able to prevent laying the bridges. At last, at the suggestion of Gen. Hunt, a small body was rowed across the river, and drove out the Confederates. Sumner and Hooker's divisions then crossed in the evening and Franklin crossed two miles below, where the bridges had been laid without difficulty. The entire crossing had occupied two days, and the Confederate position was so strong that a successful attack seemed almost hopeless. Still Burnside was unwilling to withdraw. On Dec. 13, after the fog lifted from the valley, Franklin moved against Jackson's advanced line, and in spite of a heavy fire pushed across the railroad and up the ridge until he reached a new military road which Lee had constructed to facilitate communications between his wings. Here his force was attacked on all sides and driven back with considerable loss. Jackson followed up his advantage, and, though Meade was reinforced, he was driven still farther back. On the right Sumner had ordered French's division to move from the town against Marye's heights about noon. After crossing a canal they encountered a stone wall occupied by about 1500 men, while the ground in front was completely swept by the batteries on the crest above. Here division after division fell before the deadly fire, and though Burnside refused to countermand the attempt nothing was effected but the sacrifice of thousands of Union soldiers. Even on the next day Burnside wished to renew the assault, but his corps commanders prevailed upon him to desist. During a storm on the night of the 15th the remnant of the Union army was brought back to Falmouth. Its total loss was 12,321, of whom 2078 were missing. The Confederate loss was 5309. A week later, at the unanimous request of the division commanders, Burnside was relieved of his command, and Hooker appointed in his place.

FREEDMEN'S BUREAU. Before the passage of the act of Congress constituting what is usually called the "Freedmen's Bureau," but technically known as "The Bureau of Refugees, Freedmen, and Abandoned Lands," a deplorable state of society, which had resulted from the civil war, confronted the people of the United States. The operations of the various armies, north and south, sundry acts of Congress, and proclamations of the President which were finally made good by amendments to the fundamental law, had set free nearly 5,000,000 slaves, and had disturbed them and also large numbers of the free population of the States in their residence and ordinary means of subsistence. They had followed the moving armies and flocked to the nearest towns seeking safety, food, clothing, and shelter. At the close of the war, May, 1865, the government, through its various agencies, was feeding, by daily issues, 148,000 freedmen and white refugees, and this pauper element seemed to be hopelessly on the increase. The pictures presented throughout the Southern States of men, women, and children herded together promiscuously in abandoned army store-houses and temporary barracks, in want and squalor, beggared description. The ordinary local law was inoperative, and as yet (in 1865) there had been no replacement. The very foundations of social existence were broken up. Meanwhile Congress delayed its decisions upon the new problems presented, such as these: What to do with the enfranchised? What with their masters? How to regulate the new machine? Cannot some temporary measure relieve the people from the shock incident to the sudden emancipation?

The discussion in Congress was earnest and often heated. Finally the House passed, by the very small majority of *two votes*, the "Freedmen's Bureau Act," placing the new division as an attachment to the department of war. This act, dated March 3, 1865, was broad in its scope, covering the control of "all subjects relating to refugees and freedmen" found in any part of the country affected by army movements. The bureau was by subsequent legislation extended to embrace not only the States that had been slave, but any section whatever that contained the beneficiary classes named in the law.

The Commissioner.—The management was given to a commissioner, to be appointed by the President with the advice and consent of the Senate. Assistant commissioners were also authorized by the act of similar appointment. But the President at his option could detail the commissioner and any or all of his helpers from the army. The powers originally conferred were much enlarged in the subsequent acts of Congress with a view to such care and supervision of these wards of the government as to facilitate their becoming self-supporting citizens. The law-makers plainly intended that their new freedom should not be misunderstood nor misdirected, but be a blessing to themselves and to the country which had made them freemen.

A congressional committee said: "The colossal proportions of the work of the bureau will be seen at a glance. Its operations extended over 300,000 square miles of territory devastated by the greatest war of modern times, more than four millions of its people sunk in the lowest depths of ignorance by two centuries of slavery, and suddenly set free amid the fierce animosities of war; free, but poor, helpless, and starving. Here, truly, was a most appalling condition of things. Not only the destiny of the liberated race was in the balance, but the life of the nation itself depended upon the correct solution of this intricate problem."

The President, Abraham Lincoln, for a time delayed the execution of the law; first, because there was no appropriation of money for carrying it out, and further, because he was in doubt as to a person specially fitted for such a difficult and extraordinary task. He had however notified his secretary that he would wait till Gen. Oliver O. Howard, Gen. Sherman's right wing commander, could be spared from the field of military duty in the South, and then assign him as commissioner according to the provisions of the law by which he could detail military officers to that duty. After the death of Mr. Lincoln, upon the suggestion of the secretary, the new President, Andrew Johnson, appointed Gen. Howard to be commissioner, May 12, 1865, and all matters which by a varied correspondence had been accumulating and not settled concerning abandoned property, freedmen, and refugees were at once transferred to him. He entered without delay upon his trust and proposed an organization according to the law.

The secretary of war desired him to select army officers as far as practicable for assistant commissioners and to obtain, by detail, other subordinate helpers from the officers off duty; those who could best be spared from the army and especially from the veteran reserves. These latter were detailed at the will of some immediate army commander.

Assistant Commissioners.—The assistant commissioners at first had a district often embracing more than one State. Col. Orlando Brown, having begun work in care of freedmen's affairs under army rule in a portion of Virginia, was given charge of the entire State, as assistant commissioner, with station at Richmond, Va. His previous experience gave him a special fitness. Col. Eliphalet Whittlesey was assigned to North Carolina, and stationed at Raleigh; Gen. Rufus Saxton, already in charge of the coast of South Carolina, to South Carolina, Georgia, and Florida, with station at Beaufort, S. C.; Col. T. W. Osborne to Alabama, with station at Mobile; Capt. T. W. Conway, who had been put in charge of freedmen's affairs in the South-west by Gen. Banks, to Louisiana, with station at New Orleans; Col. Samuel Thomas to Mississippi, stationed at Vicksburg; Gen. Clinton B. Fisk to Kentucky and Tennessee, stationed at Louisville (later at Nashville); Gen. J. W. Sprague to Missouri and Arkansas, stationed at St. Louis, Mo.; Col. John Eaton, Jr., to whom Gen. Grant had previously given freedmen's affairs along the Mississippi River, was brought to the East and assigned a territory including the District of Columbia, Maryland, and West Virginia, and was stationed at Washington, D. C.

Such were the assistant commissioners named by the commissioner and confirmed by the secretary of war. They soon organized their districts into sub-districts and procured a sub-assistant by detail, as already explained.

Many changes of officers were made during the first summer and fall. We find Gen. Saxton's territory reduced to South Carolina, with station at Charleston; Gen. Davis Tillson sent to Georgia, with station at Augusta; Gen. Wager Swayne to Alabama, station at Mobile; and Col. Osborne transferred to Florida, with station at Tallahassee. Gen. E. M. Gregory was first assigned to Texas, with station at Galveston. In time many of these worthy assistant commissioners were, for a variety of reasons, exchanged for others. The President, in consequence of the numerous complaints of former slave-owners, thought the military commanders—who had been subsequently assigned under acts of Congress applying to reconstruction of the States—would give better satisfaction, by combining in one person the duties of military commander and bureau official in each State or district.

Principally according to this arrangement, Gen. J. M. Schofield and Gen. A. H. Terry became in succession assistant commissioners for Virginia; Gen. Nelson A. Miles and Col. J. V. Bomford likewise for North Carolina; Gen. R. K. Scott for South Carolina; Gen. C. C. Sibley and then Col. J. R. Lewis for Georgia; Gen. W. P. Carlin for Tennessee; Gen. J. C. Davis and, following him, Gen. S. Burbank, for Kentucky; Gen. C. H. Howard for the district which included the District of Columbia; Gens. Absalom Baird, J. H. Mower, Col. W. H. Wood, and Gen. R. C. Buchanan successively for Louisiana; Gen. G. H. Smith for Arkansas; Gens. Charles Griffin, J. B. Kiddoo, and J. J. Reynolds for Texas. Gen. Gregory became after a time assistant commissioner for Maryland, and Gen. Whittlesey passed from North Carolina to aid the commissioner at his headquarters at Washington.

As the assistant commissioners were already prominent or have since become historic, the mere mention of their names vouches for their character.

The sub-assistant commissioners usually had much of the practical field-work; as holding minor courts, settling contracts, adjusting differences, sustaining schools, making reports, and generally endeavoring to carry out their instructions. At first they came from the existing army; but many of them after the mustering out of our troops were "volunteers retained in service," provided for by law.

The General Head-quarters.—When Gen. Howard took charge of these new duties under the bureau act, he naturally organized his office in Washington according to army usage, the more so because the bureau was in the department of war. Almost the same organization took place with each assistant commissioner who had charge of one State or more. The secretary of war ordered this bureau to have a building or buildings for its general office, separate from the "War Department" proper. This office was first established in Washington at the N. E. corner of 19th and I Streets in a vacant family residence. In time the work grew and caused the occupancy of a house opposite and other buildings at the capital. Finally, after the Howard University had been built, the head-quarters office was located in a part of its largest building. The portions that could, at the time, be spared from the pupils by the trustees were rented to the bureau for its different divisions. Many of the poor students in time became clerks, messengers, or other employés of the bureau and remained so till its close—that is, from 1868 till 1872.

The division of the head-quarters or "Home Office" of the commissioner will afford an insight into the enormous work undertaken by this bureau; a work from its nature necessarily diminishing in its extent till accomplished, except, of course, the educational institutions which it helped into permanent being. These were continued and enlarged.

Adjutant's Division.—The immense bundles of papers, containing suggestions, complaints, petitions, distressing evidences of poverty and suffering now came into the hands of the commissioner. Mr. Stanton, the secretary of war, gave him too a large basket filled to repletion with reports and other communications. It was plain that this work with records and papers would increase, so that he established an adjutant's division in the outset and made it the centre and spring of all the bureau operations. To this division was assigned Lieut.-Col. Saml. L. Taggart, an officer who had had long experience in the adjutant-general's office of the Army of the Tennessee. After a short time he was succeeded by Col. J. S. Fullerton. On his resignation (for the several years of this bureau's existence) Gen. Max Woodhull, Cols. Samuel Thomas and A. P. Ketchum, and Gen. Eliphalet Whittlesey successively filled the chair. The necessary books of record, with a sufficient number of clerks to do the writing, usually fell to the adjutant's division. The officer holding this position was officially denominated adjutant-general of the bureau of R. F. & A. L. He was ever the assistant and confidential adviser of the commissioner, and did all business, like a partner of a commercial firm, in his name when the commissioner was absent, as he frequently was obliged to be on tours of inspections.

Quartermaster's Department.—Though there was at first no appropriation of funds by Congress the bureau had two sources of supply. *First, the abandoned property*—such as abandoned barracks, storehouses, hospitals, sheds, and such structures as had been put up and used by the Confederates before their final surrender to the United States; also all lands, with any buildings thereon, which disloyal citizens had deserted and left to the possession of the military occupation; lands ever increasing as the war progressed and very extensive at its conclusion. This class of property included the Sea-islands, which a military necessity had, during his march from the sea, compelled Gen. Sherman to people with some eight or nine thousand freed people that had followed his armies and clogged their operations. These valuable possessions had been long deserted by their owners and many sold at tax sales to Northern men and to freedmen. Unending questions also arose about these fertile and coveted lands, promised by a great commander to the refugees of Georgia and the Carolinas. *Second,* the law and orders permitted the issue of rations and clothing and the giving of shelter to the suffering throngs of destitute whites and swarming blacks. The army, previous to this bureau, had been so supplying 144,000 impoverished people. These were at once transferred to the new bureau. The commissioner designated this part for supply, with its clerks and assistants, the *quartermaster's division,* and first assigned to its charge Lieut.-Col. George W. Balloch, who belonged to the commissary department of the army. He really did for a few months the duty of quartermaster and commissary. An immense host was sheltered, their nakedness covered, and they were fed. At once the hostile cry arose, "That Freedmen's Bureau feeds niggers in idleness!" But the cry did not last long, for every energy was put forth to reduce the pauper class; in fact the number helped by the bureau to food went down in two months from 144,000 to less than 20,000 persons.

During a severe famine which occurred in 1867 among the blacks and whites along the southern coast, a special commissary branch was formed and a direct appropriation of money, $500,000, was made by Congress. A sufficient number of assistants to execute the provisions of the appropriation act were given to Gen. E. Whittlesey, who was placed in charge of this business. The money helped all classes of society where the famine raged; multitudes were saved from starvation. The commissioner closed out this branch as soon as the object of the special appropriation was effected.

Medical Division.—Early in 1865 sickness, more or less severe, set in among the beneficiaries in Washington and almost every Southern town. Aged negroes, both men and women, must be taken care of; and multitudes of children were left without parents or with but one parent not so circumstanced as to support them. The accounts of this suffering were so touching that the benevolent people of the country had organized asylums and put into operation various hospitals. Confederate hospital buildings and abandoned government field-hospitals, many of which had come into disuse, were solicited from the war department and devoted to the relief of the young, the aged, and the sick freed people and refugees. The commissioner as soon as possible started a medical division and gave these helpless recipients of bounty to its keeping. Dr. Caleb W. Horner, of the army, took charge and regulated the supply of medical officers, nurses, food, and medicines. He was succeeded by Dr. L. A. Edwards, U. S. A., and he later by Dr. Robert Reyburn. Little by little, after the reconstruction of society and government had been effected, there was obtained by the bureau, on conditions favorable to the beneficiaries, a transfer of these asylums and hospitals to local authorities. However, many of the old and helpless who could not in the change be provided for in the South were transferred to the permanent Freedmen's Hospital at Washington. A few of these were over a hundred years of age.

The Land Division.—The first officer who took charge of the "abandoned lands" and commenced a systematic record was Major William Fowler. He was succeeded by Gen. A. P. Howe; and the latter by William P. Drew. The books soon showed a large amount of this kind of property, over 800,000 acres of farm-land and 3373 town-lots, besides other species of deserted property that naturally came with the land. It was not long after the records had been made before the policy of the executive rendered it necessary to restore much of this property to the original owners under specific rules established by the President. Some, however, remained for the bureau revenue in lieu of specific appropriations, none of which were made during the first fiscal year. The commissioner recommended in December, 1865: *First,* that the land-owner agree to set apart and grant title, in fee simple, to each head of family of his former slaves a homestead varying in extent from five to ten acres, to be secured against alienation during the lifetime of the grantee. *Second,* that others (former slave-owners) be like conditioned according to their circumstances, to be determined by a committee appointed by the President.

After consideration, Pres. Johnson overruled this method. A formal pardon was extended to several classes of those who had lost their estates, and on the acceptance of this pardon the lands were given back without further condition. This administrative action practically hindered the operation of the law, so that the commissioner reported: "The uncertainty of the bureau over property, which is the result of the policy of restoration adopted, has rendered the division and assignment of land to refugees and freedmen impracticable."

The commissioner, however, took advantage of the homestead laws and helped many refugees and freedmen to settle on public lands. He met with considerable difficulty here, principally from resistance of the emancipated, they being averse to isolation. Unless a village system obtained the farms were soon deserted. A large number of the very poorest congregated on valuable lands near Washington. In order to remove them the bureau, among other expedients, assigned to each head of family an acre lot and put up for shelter a small house. For gaining a homestead here the family worked in the city for wages and paid the cost by instalments. This course had many good points, promoting as it did thrift and industry. Of course some failed, but schools and churches and happy communities mainly resulted. The vast majority of the Southern freedmen sought out their former occupations, becoming servants, mechanics, and laborers in the cities, or finding work on cotton or rice plantations or other farms in the country, so that the loss of the abandoned lands, even of those assigned to them by Gen. Sherman on the southern coast, though causing much disappointment and crimination and complaint, did not long keep them from securing subsistence and competency.

The Sanitary Commission, a volunteer benevolent organization, had for a time aided various needy families of the beneficiaries, including those of the colored soldiers, sailors, and marines, to collect, without charge, bounties, prize-money, and other government dues. This commission, on closing its operations, transferred this incomplete work to the Freedmen's Bureau, and the commissioner gave it to the land division, which was then fast completing its land records. The chief of this division reported for this claim branch 4000 cases taken up and settled in 1867, and 17,000 cases in 1868. The difficulties of this business will appear from a brief extract taken from the commissioner's report of 1869: "It is not possible by any machinery to furnish absolute security to both the claimants and the government against fraud. The inventions of cupidity are almost infinite, and, when no other scheme is successful, the last resort of baffled dishonesty is to turn upon the bureau agents with false charges in the public prints for the purpose of getting them disgraced and removed."

Self-constituted claim agents were abundant, and many of them defrauded the ignorant discharged soldiers and marines, getting from them a part or the whole of their just dues.

The Bounty Division was, therefore, established by act of Congress, March 29, 1867. The work of this division was the most difficult of all, and the accusations against the disbursing officials were immediate and constant. The law itself, unfortunately, required that all bounties and other back dues should be paid to the individual claimant *in currency* and never by cheques or drafts. These payments had to be made in every part of the country, though most generally in the former slave States. If any bureau agent became corrupt and withheld a part of the money due a discharged soldier, while he secured from him his signature to a proper and full voucher, there was no effective remedy. It was extremely difficult to discover the fraud in time to recover or punish. But fortunately there were but very few such corrupt officials. A few, however, were found who were hotly pursued and punished by the commissioner. From April, 1867, to 1872, there were $5,831,417.89 paid in bounties and prize-money by the bureau to colored soldiers and sailors; and before the closing of the bureau, bounty- and prize-money payments exceeded $8,000,000. The whole work was carefully systematized, so that there was at all times a complete record, a full history, of each case, so that every essential item concerning it could be traced.

The Financial Division.—Early in the organization all the financial matters proper were gathered into one responsible division. To this after the passage of the Bounty Act in 1867 were also given the bounty- and prize-money payments. George W. Balloch, the commissary before mentioned, who was a lieutenant-colonel in the volunteer army and a brevet brigadier-general, a bonded officer of excellent record during the war, was placed by the commissioner at the head of the finances. He remained in charge from June, 1865, till 1871. The total receipts and expenditures amounted to more than $13,000,000 for the Freedmen's Bureau proper, and, as just said, over $8,000,000 more for bounty- and prize-money to colored soldiers and sailors, making an aggregate of over $21,000,000.

After Gen. Balloch's discharge in 1871, the commissioner, Gen. Howard, himself made the disbursements for a short time and then, at his request, Major J. M. Brown was assigned to this division and remained in charge till the close. Political manœuverers, angry and greedy claim-agents, officials disappointed and discharged for cause, and other malignants, aimed their shafts especially against the disbursing officers of the bureau. Twice was there a lengthy examination, once by a congressional committee, and at the close by a special court of inquiry ordered by Congress. In the first case a majority vindicated the officers and a vote of thanks by the House was awarded the commissioner; and in the second case the court and the President relieved him of the charges and commended his work. It was shown in these investigations that the entire loss to the government in these vast expenditures was within one-eighth of one per cent. of the money disbursed.

General Work.—Much of the work of the Freedmen's Bureau was of a general character and retained by the commissioner under his own eye. A small clerical force kept for him a full record. He had aides and inspectors, such as Lieut.-Col. H. M. Stinson, Capts. Joseph A. Sladen and M. C. Wilkinson, aides, and Gens. W. E. Strong and F. D. Sewall, and later J. M. Langston, Esq., inspectors. The commissioner and these assistants went often over the field, inspecting books and accounts, examining complaints, encouraging the agents who were diligent and faithful, looking into the schools, colleges, and universities, or visiting the hospitals and asylums. Whites and blacks were seen and conferred with. The appeals of employers and employés were heard, and controversies growing out of the new relations adjusted.

Many public addresses were given to mixed multitudes in the interest of industry, frugality, and progress under the new and free system of government. The most important of all subjects were those relating to the schools and the "labor questions." Written contracts succeeded well; and the joint stock companies with capital, encouraged by all the bureau agents who came in contact with the workingmen, gave in the very first year wonderful results. It is remarkable that referring to a single class of products, the cotton, more cotton was produced that year in the cotton States than ever before in any one year under slave-labor. Planters where they had been most fearful began to have hopes of success and the laborers to realize somewhat the value of their freedom.

From "labor questions" arose such a multitude of differences that to meet them some magistracy was demanded. Courts of three, for minor civil cases, were early constituted. The employers nominated one, the freedmen another, and the bureau agent was, ex officio, the third member. These courts did an excellent work. They were the first to receive the testimony of the negroes. These courts were after a time replaced in Alabama by the local justices, on an agreement with the reconstruction governor that all the courts, State and local, should admit the testimony of the colored people, an agreement which the assistant commissioner, Gen. Wager Swayne, negotiated. Finding that this procedure worked well, the same was extended to other States and the bureau courts closed.

School Division.—Mr. J. W. Alvord, a man of education, who had been so employed before and during the war of rebellion as to bring him much in contact with all classes of the Southern people, was made by the commissioner "general superintendent" of the bureau schools. He had his assistant superintendent in each State and district, whose duty it was to aid the assistant commissioner in all things which pertained to the schools, and to make constant and careful reports of what was undertaken and accomplished within the limits assigned him. The commissioner had a consultation with the secretary of war in May, 1865, on the subject of schools for the freedmen and refugees. It was agreed that *the true relief* in the transition period was to be found in education. The first "Bureau circular," dated May 19, 1865, is significant. It promises to all interested that the moral and mental condition of the refugees and freedmen shall not be overlooked. The commissioner declares: "That in all this work it is not my purpose to supersede the benevolent agencies already engaged in it, but to systematize and facilitate them."

After the first enthusiasm of the Northern helpers had subsided, still the bureau educational agencies continued. The decrease of the number of temporary dependents and the amount of intelligent apprehension of their rights and privileges seemed directly correspondent to the knowledge acquired through the schools. Many adults attended, yet much of the important information came from the children whom faithful teachers were instructing.

The commissioner, who was able to save a part of the funds first devoted to the transportation of refugees and freedmen from places where they were congregated to places of employment, was instructed by subsequent legislation to devote these funds to education. In order to co-operate effectively with church societies and freedmen's commissions he sought first to consolidate them into a less number of agencies. He so far succeeded that from twenty-seven they were so combined as to make but three or four. Then he proposed that, for every dollar this bureau gave, the benevolent agency should add a dollar. It was so done. The agency would find and pay the teacher. The bureau would rent a building for a school and transport the teacher thither. The agency would buy a piece of ground and organize a board of trustees. The bureau would erect structures for teacher's house and for school purposes thereon.

It was thought that the higher grades of schools, like academies, colleges, and universities, were essential to furnish a constant supply of competent teachers. To supply these, six universities and some twenty colleges and normal academies came into being and have been continued with success for many years. The abundant primary and common schools were the nuclei around which the numerous subsequent State, county, and city schools have since formed. To give a slight glimpse into the difficulties of this school work a brief extract from a bureau report of 1869 is inserted, to wit: "Too much praise cannot be bestowed upon the noble band of Christian teachers who have carried on successfully this work of education. Many of them have come from the very best circles of refined and cultivated society, and have been exposed to privations, hardships, and perils which would have discouraged any who were not moved by the spirit of the Divine teacher. To them belongs the credit, in great measure, for all that has been accomplished. They have done the hard work; they have been the rank and file in the long fight with prejudice and ignorance. When they first entered the field as teachers, so general and bitter was the opposition to the education of the blacks that scarcely one white family dared to welcome them with hospitality. When they were insulted and assailed very few had the courage to defend them, but their good conduct finally overcame prejudice and better sentiments have gradually grown up in many parts of the South. Hostility to teachers and schools has in a great measure ceased." (Bureau Report for 1869, p. 12.)

The first year (1865–66) there were 975 of these schools and 96,778 pupils. In 1870, 2118 schools and over 250,000 pupils. In the House resolution, the language is comprehensive: *Resolved*, That the policy pursued by the United States toward four and a half millions of its people suddenly enfranchised by the results of a great civil war, in seeking to provide for them education, to render them independent and self-supporting, and in extending to them civil and political equality, is a source of just national pride. . . . This was done mainly through the agency of the Freedmen's Bureau. To sum up its operations, it may be said: The bureau met the impoverished and helpless classes and aided them either into self-support or provided permanently for their wants. It transferred thousands upon thousands to places of employment. It organized labor upon a permanent basis and demonstrated the practicability of a free system. It brought the freedmen into the courts of law by a gradual and protecting process. It found the marriage relation ignored. Here it brought in and enforced wholesome regulations. In fact as the commissioner has said elsewhere: "Scarcely any subject that has to be legislated upon in civil society failed at one time or another to demand the action of this singular bureau."

The Freedmen's Bank and its branches were instituted under quite another law than that of the Freedmen's Bureau. They had their beginning in a special charter by Congress. The trustees were at first mainly benevolent business men of the North. The bank was attached to no department of the government, and in its management and control had no connection whatever with the Freedmen's Bureau.

In the appropriation bill for 1872 it was provided to discontinue the Freedmen's Bureau, discharging all clerks and employés except such few as the secretary of war should retain for the bounty division. The date of this general closing was June, 1872.

When the years of party strife shall have passed and the student of history is solicitous only for facts, then he will commend the wisdom of the United States legislators of 1865 who so effectually provided for relieving society from the fearful anarchy which sudden emancipation had caused; he will also commend the Freedmen's Bureau officials, commissioners, agents, teachers, and humble employés who, amid ostracism and great danger sometimes attended with loss of life, toiled for years in the interests of humanity and human progress to execute this Freedmen's Bureau law.

(O. O. H.)

FREEMAN, Edward Augustus, an English historian, was born at Harborne, Staffordshire, in 1823. He was the son of a country gentleman and was educated at Trinity College, Oxford, becoming in 1845 a fellow of the college. He devoted himself to historical studies, but his early essays indicated a purpose rather to connect these with the great buildings left as the mark of each succeeding age. His first work was *A History of Architecture* (1849); then followed *An Essay on Window Tracery* (1850), and *The Architecture of Llandaff Cathedral* (1852). The interest aroused by the Crimean war in all matters pertaining to the East was the stimulus which led to his preparation of *A History of the Saracens* (1856), and in a similar way the outbreak of the American civil war led to his incomplete *History of Federal Government* (1863). Freeman is a thorough advocate of constitutional liberty, and a firm believer in that idea of race which has come into prominence in the recent history of the world. His great work on the *History of the Norman Conquest of England, its Causes and Results* (6 vols., 1867–79) serves as an illustration of both these principles. It is marked by the same graphic style as his former works, while it displays abundant evidence of careful research and scrupulous regard for accuracy of fact. Since the completion of his history of the interesting epoch which he had first selected for investigation he has added two volumes on *The Reign of William Rufus and the Accession of Henry I.* (1882). He has also published from time to time historical essays, marked with freshness, originality, and keen insight. Among these may be mentioned *Old English History* (1869); *Growth of the English Constitution* (1872); *Historical and Architectural Sketches, chiefly Italian* (1876); and especially three volumes of *Historical Essays* (1871–79). In the various questions of the day, arising out of general European politics, he has taken great interest, making his deductions from past history bear with great force on the issues of the present time. As has been seen already some of his more important works have been suggested in this way. Another work of similar origin is *The Ottoman Porte in Europe; its Nature, its Growth, and its Decline* (1877). In opposition to the Turkish power he advocated the liberation and nationalization of its subject Christian races. The result of his observations in a journey through the countries on the east side of the Adriatic Sea in 1880 appeared in his *Sketches from the Subject and Neighbor Lands of Venice* (1881). From October, 1881, to April, 1882, he made a journey through the northern part of the United States delivering lectures, which were afterwards collected into a volume under the title *Lectures to American Audiences* (1882). They comprise two series, one having reference to the development of the English race, the other to the forms of government in Athens, Sparta, Rome, and England. After his return to England he published *Some Impressions of the United States* (1883).

FREEMAN, JAMES (1759–1835), an American Unitarian clergyman, was born at Charlestown, Mass., April 22, 1759. He graduated at Harvard College 1777, and in 1782 was made lay-reader in King's Chapel. The congregation had belonged to the Church of England, but was led by Mr. Freeman's influence to abandon the doctrine of the trinity, as he had done, though still retaining the use of the liturgy with some modifications. He was ordained pastor of the society Nov. 18, 1787, and held this position till his death. He had great influence in the community, and took prominent part in social and philanthropic movements. He received the degree of D. D. from Harvard College in 1811. He died at Newton, Mass., Nov. 14, 1835.

FREEMAN, JAMES EDWARD (d. 1884), an American artist, was born in Nova Scotia, but at an early age was brought by his parents to Otsego, N. Y. With difficulty he made his way to New York city, where he studied in the National Academy of Design, and became an associate in 1831 and a full member in 1833. He married a sister of Claudio Latilla, an Italian artist, who had settled in New York. Freeman painted for a time in Western New York, but about 1840 took up his residence in Rome, though he still occasionally sent pictures to the National Academy. Among his works are The Beggars, The Savoyard Boy in London, Young Italy. He published *Portfolio of Italian Sketches.* He died at Rome Nov. 21, 1884. His wife also devoted herself to sculpture, producing among other works The Culprit Fay.

FREEMASONRY has, as the pages of history show, been cherished and perpetuated by a devoted brotherhood through centuries. Established for the purpose of fraternal deeds of charity and benevolence, it has spread in various shapes over the whole earth, and it has seconded the Christian religion in inculcating morality and the worship of the true God, whose name it has sacredly preserved. Through social vicissitudes and political revolutions the fraternity of freemasons still survives. Its mystic ceremonies have never been divulged, and its numbers have steadily increased, while almost innumerable other associations, patterned more or less after it, have flourished for a season and then disappeared.

See Vol. IX. p. 657 Am. ed. (p. 747 Edin. ed.).

The traditions of Freemasonry have handed down to us the character of many of the fraternity, whose learning and talents were the charm of their own and of all succeeding time. The brethren of the mystic order take pride in seeing inscribed on their rolls the names of so many philosophers, scholars, and statesmen of glorious renown who have mastered their mysteries. Its emblems convey moral lessons, teaching the brethren to feed the hungry, to clothe the naked, to reclaim the wandering, to instruct the ignorant, and to relieve the distressed. The fraternity professes the highest veneration for King Solomon, "the beloved of the Lord," and it adopts as its peculiar pattern St. John the Baptist, the harbinger of Jesus Christ. Every one received into the Masonic order in Christendom is given the Holy Bible as "the rule and guide of his faith and practice."

When the British colonies were established on the Atlantic slope of the continent of North America by adventurous bands of pioneer emigrants, the foundations were laid of a great nation, the people of which would be insured religious, social, and political freedom. Churches and schools were in due time followed by Masonic lodges, and the halls set apart for their accommodation were duly consecrated with corn, wine, and oil, that the brethren therein assembled might be "blessed with the corn of nourishment, the wine of refreshment, and the oil of joy." Some of these lodges were chartered by the Grand Lodge of England, and others by the Mother Kilwinning Grand Lodge of Scotland. When the colonies declared their independence, a large number of the leading citizens were freemasons, and agreed with their brother, George Washington, that "the grand object of Masonry is to perpetuate the happiness of the human race." The order flourished in a land where there was liberty of thought and freedom of conscience, adopting as a tenet, "Honor all men—love the brotherhood." After independence was secured, grand lodges were formed in all of the original States, and an attempt was made to organize a Federal grand lodge, with George Washington as grand master, but it failed.

Freemasonry grew and prospered with the growth of the United States, and received a great impulse in 1825 from the visit of brother Lafayette. Fifty years had elapsed since he had first crossed the Atlantic to peril his life in behalf of freedom, and the descendants of those who had stood shoulder to shoulder with him on hard-fought fields gave a fraternal welcome to the friend, the fellow-soldier, and the brother freemason of George Washington.

In 1826 the assertion that William Morgan had been abducted and drowned because he had revealed the secret of the order raised the storm of anti-masonry, which swept over the country like a tempest. The most outrageous falsehoods and absurdities connected with Freemasonry were circulated for political purposes, and it was in vain that members of the order, of the highest respectability, declared that they had taken no obligation contravening their duties to God, to their country, to society, or to themselves. Many freemasons bowed before the storm of political persecution, and hundreds of lodges were temporarily closed. But after a few years had elapsed, Freemasonry, true to itself and to its principles, arose purified and regenerated. (See ANTI-MASONRY.)

It was the boast of the politicians who had conducted a crusade against Freemasonry that not one stone had been left above another in the walls of the masonic temples throughout the country, and that they had driven the plowshare of ruin through the foundations, so destroying the mystic keystones that the inscriptions on them could not be deciphered. But the "ancient land-marks" remained; the time-honored temples were again gradually re-dedicated; good and true men were initiated, and Freemasonry, with recruited ranks, resumed the discharge of its duties. There is now a Grand Lodge of Masons in every State of the Union, each with its subordinate lodges, with 593,164 regularly affiliated master-masons on their rolls.

Royal Arch Masonry, which exists in English-speaking countries, is supplementary to the universal three first degrees—entered apprentice, fellow-craft, and master-mason. The degrees of Mark Master, Past Master, Most Excellent Master, and Royal Arch Mason, are conferred in Chapters. Delegates from the Chapters in each State constitute a Grand Chapter, and the representatives of the Grand Chapter constitute the General Grand Chapter of the United States, which was organized in 1816. There are now in the different States 44 Grand Chapters, with 140,960 regularly affiliated companions on the rolls of subordinate chapters.

Templar Masonry is a semi-military organization, based on the "valiant and magnanimous order" of the Knights Templar, who are believed to have been initiated into the mysteries of Freemasonry. The Templar degrees are only conferred upon master-masons who have also taken the royal-arch degrees, and it is affiliated with, although totally independent of, those organizations. The only distinction is, that while Hebrews can take those degrees, Knights Templar must believe in the divinity of Jesus Christ. The cross is inscribed on the banners of the order, and under that "sign" they march shoulder to shoulder, to combat intolerance, error, and infidelity. The local commanderies of Knights Templar are dedicated to St. John the Almoner, and in them are conferred the orders of Knight of the Red Cross, Knight Templar, and Knight of Malta. There is a Grand Commandery in almost every State, and its delegates form the Grand Encampment, originally organized in 1816, which meets triennially. The Knights Templar always appear in public, either mounted or on foot, in uniform, and armed. They have a distinctive system of tactics, and since the war of 1861–65 they have received into their ranks so many old soldiers that they march and drill like veterans. There are in the United States 725 Commanderies, with 68,226 regularly affiliated Sir Knights.

The Ancient Accepted Scottish Rite of Freemasonry, which is entirely independent of the organizations of the York rite already mentioned, consists of thirty-three degrees, commencing at the entered apprentice, and ending with that of Sovereign Grand Inspector General. In some countries a Supreme Council, formed of nine Inspectors General, constitute the grand masonic tribunal of the rite, and there are two Supreme Councils. That of the Southern Jurisdiction, the "Mother Council of the World," established in 1801, which has its see at Washington, exercises jurisdiction over the States south of Mason and Dixon's line, and the States and Territories west of the Mississippi River. The other States are under the Supreme Council of the Northern Jurisdiction, organized in 1807, which has its see at New York. Albert Pike is at the head of the Supreme Council for the Southern Jurisdiction, and Henry L. Palmer is at the head of the Northern Jurisdiction. Each State has its bodies of the various "Sublime Degrees," as they are called, with a Grand Consistory. There have been several schisms in the Northern Supreme Council at different times, and there is now a Supreme Council which claims authority from a body organized by Joseph Cerneau in 1813, as "the Supreme Council for the United States of America, its Territories and Depen-

about 13,000, of whom about 10,000 are included in the northern jurisdiction.

In addition to the degrees and rites above mentioned, there have been others invented, from time to time, to gratify those who have desired masonic novelties. Among these have been the "Rite of Memphis," with ninety-five degrees, the "Rite of Misraim," with over one hundred degrees, and a variety of offshoots from the Scottish Rite. There is also a Supreme Council, a Grand Encampment, and a Grand Lodge of Freemasons of African descent, claiming to derive legitimate authority from grand bodies in Great Britain and France. The periodicals in the United States devoted to Freemasonry are: 1 quarterly magazine, 9 monthly publications, 2 semi-monthly and 4 weekly. Nearly all of the "grand bodies" publish their annual transactions, complete collections of which are highly prized; and there is a constant publication of books devoted to Freemasonry, some of which contain much valuable historical information concerning distinguished members of the order. (B. P. P.)

FREEPORT, a city of Illinois, county-seat of Stephenson county, is situated on the Pecatonica River (an affluent of Rock River), 120 miles by rail W. of Chicago. It is on the main line of the Illinois Central R. R., where it crosses the Racine and South-western Division of the Chicago, Milwaukee, and St. Paul R. R. It is the western terminus of a branch of the Chicago and North-western Railway, which gives it direct communication with Chicago. It is the seat of active and varied manufactures, has 2 national banks, a large number of churches and schools, 5 weekly newspapers, and a handsome court-house. Freeport College is a Presbyterian institution founded in 1872. The town stands in a highly fertile and well-wooded region, of moderately hilly character. Its population, which was 7889 in 1870, had increased in 1880 to 8516.

FREE SOIL PARTY. The anti-slavery movement in the United States was originally and exclusively a movement depending on moral agencies. Its leaders appealed to the moral judgment of mankind against the injustice and inhumanity of slavery, and called on all slave-holders to confess and forsake the wrong with which they were charged. They published no appeals addressed to slaves, as they were absurdly charged with doing, for few of that class could have read them, and they disavowed any thought of invoking force or violence. As slavery was the creature of legislation, and the United States exercised legislation over the District of Columbia and the Territories, petitions numerously signed were sent asking for the abolition of slavery within the territorial jurisdiction of Congress. The refusal to receive such petitions led to a controversy protracted through several sessions (1836–44), in which the right of petition was vindicated by Mr. John Quincy Adams, and at length, on Dec. 3, 1844, with success. The House of Representatives was constrained to acknowledge the right of citizens to present and the duty of Congress respectfully to receive their petitions, though the prayer of the petitions could not be granted. Indeed, Mr. Adams himself was not prepared to vote for the legislation asked for. The beginnings of political action were exceedingly modest. Candidates for Congress and the State legislatures were interrogated by abolitionists, who voted for such as expressed satisfactory views on slavery. The Massachusetts Anti-Slavery Society had from the first declared that it was their duty to be faithful to their convictions "in the church or out of it, at the ballot-box or away from it." But no form of party organization was then thought of. Mr. Garrison, who was at that time their chief leader and protagonist, adopted extreme non-resistant views, which led him to renounce for himself all political activity. But this did not become the badge of his followers until 1843, when the Massachusetts Anti-Slavery Society demanded the dissolution of the Union, and denounced the Constitution as "a covenant tion was affirmed the following year by the American Anti-Slavery Society. That society, however, had been sundered by differences on the question of political action and other disputed points. The chief seat of political abolitionism was in Central and Western New York. A local convention held in Albany in 1839 resolved on a presidential nomination, which was offered to Mr. James G. Birney, who, however, declined it. In 1840 a convention representing six States organized the "Liberty Party," nominating Mr. Birney for President, and Thomas Earle, of Pennsylvania, for Vice-President. Not only Mr. Garrison and his followers, but some who were far from his radical position, objected to this organization. They shrewdly contended that it was impolitic for them to stand up to be counted. With their numbers unknown they produced more impression. In their moral warfare they had the sympathy of all who condemned slavery, however measured and restrained might be the expression of their feelings, but as political abolitionists they could gain the support only of the most decided and intense. The new party was also divided on some important questions. Some of them believed that the U. S. Constitution was an anti-slavery instrument, needing only to be fairly and consistently construed to make this evident. Others held that the currently accepted interpretation was sound, but included some forced constructions needing to be reversed, and that for any further amelioration the power of amendment must be relied on. Thus the party was far from embracing the whole number of avowed anti-slavery men, and in the election of 1840 their ticket received a popular vote of less than seven thousand. It must not be assumed that any large portion of the people in the non-slaveholding States were pro-slavery in their feelings. Most of them knew very little on the subject. The country was not linked together as now by railroads and telegraphs. Newspapers had a more limited and local circulation than now. People generally believed slavery to be wrong, but had no very vivid conception of the wrong and what it involved. They admitted what the Southern people constantly asserted, that slavery was a domestic institution, under State laws, with which Congress could not intermeddle. To abolish slavery in the District of Columbia would not free a single slave, but merely cause their removal —from an area ten miles square. In the only Territories in which slavery existed the institution found place by virtue of the Missouri Compromise, a solemn compact which they might regret, but which they felt restrained from breaking. To most people therefore, however sincerely they might sympathize with the anti-slavery spirit, the scope of possible political action was so small as to seem little more than an abstraction. An abolitionist party in politics was up to this time a hopeless undertaking.

The slavery question was introduced into national politics, to become a persistent and commanding issue, not by the opponents but by the friends of the institution. What the abolitionists could not do Mr. Calhoun did. During the administration of John Tyler, after Mr. Webster retired from his cabinet, the question of the annexation of Texas came to be seriously entertained. Negotiations were commenced by Mr. Upshur, then secretary of state, which were interrupted by his sudden death. Mr. Calhoun succeeded to his office and took up the threads of the negotiation. In 1843 a treaty was made with Texas. In a diplomatic dispatch, sent while the ratification of the treaty was pending before the Senate, Mr. Calhoun informed the world that annexation "was made necessary in order to preserve domestic institutions placed under the guaranty of the constitutions of the United States and Texas." He asserted that slavery was a political institution "essential to the peace, safety, and prosperity of those States of the Union in which it exists." The treaty failed of ratification, but the project was still pressed, and with the motives avowed for the measure became a popular issue. The Slavery party had definitely relinquished the defensive position they had so long occupied and now demanded that the powers of the national government should be exerted for the support and propagation of slavery. If this claim were allowed slavery would become not merely a State but a national institution. The nation was called upon to say whether this should be. The first effect of this change of front was the increase of the Liberty party vote from six thousand to sixty thousand. When the annexation was consummated in 1845, and the Mexican war followed, it was easily foreseen that Mexico would be compelled to purchase peace by a cession of territory. To the appropriation for the expense of negotiating a peace a proviso was attached by the House of Representatives, called from the name of its proposer (the Hon. David Wilmot, of Pennsylvania) the "Wilmot Proviso," by which it was provided that slavery should be prohibited in any territory that might be acquired. It was defeated in the Senate, but was taken up with considerable popular enthusiasm in the Northern States. In 1848 the proviso was attempted to be made an issue in the nominating conventions of both the national parties, and in both was thrust aside. A call was made on all who were opposed to the extension of slavery to meet in convention. That convention met at Buffalo, Aug. 9, and constituted the Free Soil party. Into the composition of this party three elements entered—the Liberty party, which recent events had strengthened; seceders from the Democratic and the Whig parties, who had revolted at the resolution to sanction or at least to wink at the opening of free soil to slavery; and the "Barnburners" of New York. The Barnburners claimed to be the regular organization of the Democratic party of the State of New York, who had been unjustly deprived of representation in the Democratic National Convention. They had resisted the annexation of Texas, and supported the Wilmot Proviso, no doubt sincerely, but they were rather allies of the Free Soilers than intimately united with them. The alliance was but temporary. They had held a convention at Utica about a month before, at which they nominated Martin Van Buren for the Presidency. Their delegates to the Baltimore Convention were authorized to attend the Buffalo Convention, and presented there this nomination, which was adopted, and Mr. Van Buren became the Free Soil candidate, with Mr. Charles Francis Adams, of Massachusetts, as their nominee for the Vice-Presidency. The "platform" of the party disavowed any intention of interfering with slavery in the States; referred to the ordinance of 1787 as evidence that it was the settled policy of the fathers not to extend but to limit slavery; declared that Congress has no more power to make a slave than to make a king; that the national government should relieve itself from all responsibility for the existence of slavery and should prohibit slavery by law in territory now free; and in favor of cheap postage, the free grant of public lands to actual settlers, retrenchment, and a tariff adequate to defray the expenses of an economical administration, and to pay off by instalments the national debt. The campaign opened with a good deal of enthusiasm, but in the election that followed no electoral vote was gained. The contest, however, was not fruitless. In New York State Mr. Van Buren received more votes than his Democratic competitor, Mr. Cass, and a popular vote, all told, of over 300,000. The party gained sufficient strength in several States to hold the balance of power between the two great parties and send to the U. S. Senate two men whose abilities made their cause respected—Charles Sumner, of Massachusetts, and Salmon P. Chase, of Ohio. These were a welcome reinforcement of Mr. John P. Hale, of New Hampshire, who, since 1847, had been the solitary representative of organized anti-slavery in the Senate. Enough members were also elected to the House of Representatives to influence seriously if not to control its action, and for the first time in our political history it was seen that national questions relating to slavery were pressing for solution in such strength as to defy suppression and to menace the Union itself.

What might have been the issue had the territory acquired from Mexico been settled in the moderate and tentative way in which new States had thus far commonly been populated it is useless to conjecture. The discovery of gold had made a State almost in a day, and when the first Congress under the new administration commenced its first session in December, 1849, California was already knocking for admission to the Union as a free State. The more vehement of the Southern extremists insisted on her rejection and the organization of California, Utah, and New Mexico as Territories with no restriction as to slavery. The Free Soilers and many others, both Whigs and Democrats, demanded the immediate admission of California as a State and the territorial organization of Utah and New Mexico with the prohibition of slavery. Further to complicate the problem a bill was introduced to facilitate the recapture of fugitive slaves. Mr. Clay, the hero of two compromises—the Missouri Compromise of 1820 and the Tariff Compromise of 1833—aspired to win new laurels. He proposed to admit California; to organize Utah and New Mexico as Territories without restriction, but acknowledging that slavery had then no legal existence there, having been abolished by Mexico before the cession; to pay Texas for some alleged claim to New Mexico; to forbid the introduction of slaves into the District of Columbia for sale, and to make provision for the recovery of fugitive slaves. Mr. Webster, who had claimed in 1847 the "prior invention" of the Wilmot Proviso, had defended its constitutionality in the Senate, and described its defeat as "portentous," now pronounced it no longer a practical question, while the peril of the Union was very real and imminent. He eloquently advocated the compromise, including the Fugitive Slave bill, which he pledged himself to support "to the fullest extent," and urged it on the conscience of the Northern people. An "omnibus" bill was drawn up to embrace in one act all the features of the compromise. Such a measure is often the most feasible method of combining the support of parties having distinct interests. But in this case each feature of the bill had so many enemies that it was defeated in detail by successive elisions. Thus far President Taylor had maintained a position of absolute impartiality, except to insist that California could not without injustice be refused immediate admission. His sudden death and the succession of Mr. Fillmore to the Presidency changed the whole aspect of affairs. The appointment of Mr. Webster as secretary of state was taken as an announcement that the Executive was fully committed to the compromise. There followed a long and anxious struggle. Up to the last moment it had more than once seemed that the situation was desperate, but at last the several measures included in the omnibus bill were taken up separately and passed. California was a State in the Union, with a constitution prohibiting slavery. Only the barren privilege of carrying slaves into New Mexico and the doubtful benefit of the Fugitive Slave act (see Fugitive Slave Laws) remained to the South of all the aggrandizement hoped for through the annexation of Texas and the war with Mexico.

The territorial question was settled. If slavery was not abolished in the District of Columbia, a certain measure of the scandal involved in it was removed by the prohibition of the slave trade there. The strongest motives for the formation of the Free Soil party no longer existed. But besides the rankling disappointments of the last year there remained the fresh provocation of the Fugitive Slave act which infused new bitterness into the controversy. The enforcement of the law in several cases was accompanied by circumstances adapted to shock men whose feelings, not specially sensitive to descriptions of distant evils, were unable to bear the bringing home of the matter to their very faces. The political element of the Free Soil party was weakened by the diminished stress of merely political motives, but its moral energy was vastly increased, and with decreasing numbers it showed more intense zeal and more energetic determination. But the weight of political, commercial, and social influence in support of the compromise measures was immense and irresistible. It seemed that at last everything was settled; North and South were in harmony; almost everybody said that a "finality" had been reached and agitation must end. In the Presidential Conventions of the Whig and Democratic parties resolutions accepting the compromise as a final and irreversible settlement of the slavery question were passed with practical unanimity. Against this tremendous array the Free Soilers assembled in National Convention, reaffirmed their principles, denounced the compromise—especially the Fugitive Slave act—and nominated John P. Hale, of New Hampshire, for President, and George W. Julian, of Indiana, for Vice-President. It was their last appearance as a party in a national election. The vote for Mr. Hale aggregated 151.000. The Whig party also made its last appearance as a national organization. Franklin Pierce carried all but four States. Scarcely had his administration been installed when, on Jan. 4, 1854, Stephen A. Douglas, of Illinois, introduced into Congress a measure for the organization of the Territory of Nebraska. An amendment was proposed by Mr. Dixon, of Kentucky, to abrogate the Missouri Compromise by which that Territory had been for thirty-three years dedicated to freedom. The Missouri restriction had been treated as having almost the sanctity of the constitution itself. It had been not only acquiesced in by the South, but attempts had been repeatedly made and supported by the whole body of Southern members to extend the compromise line to the Pacific. It was now proposed to open every foot of territory between the Mississippi and the Rocky Mountains to be struggled for by the slave-holding interest. The deed was done. The issue was accepted at the North not by the Free Soil party alone, but by thousands who had reluctantly assented to the Fugitive Slave act, had smothered their convictions and feelings for the sake of peace, and now felt that they had been bitterly deceived. The Whig party was death-struck. The Democratic party lost several leaders and a large following. But the elements of resistance did not crystallize at once. To add to the confusion a secret order, known as "Americans," or "Know-Nothings," a Native-American party under a new name, grew so strong as to carry several States and seemed likely to absorb most of the opposition to the Democratic party. But this was a transient symptom of the prevailing political unrest. In 1855 Free Soilers, Whigs, Democrats, fused by a common spirit of resistance to this last and most audacious aggression of slavery, formed the Republican Party (*q. v.*).

For authorities on the earlier phases of the anti-slavery movement see article Abolitionists, and also the *Life of William Lloyd Garrison*, by his sons (1885), a model biography. The history of political anti-slavery is given with fulness by Henry Wilson, *Rise and Fall of the Slave Power.* But for details the only adequate source is the newspapers of the day, so far as they have been preserved.

(L. E. S.)

See Vol. IX. p. 661 Am. ed. (p. 752 Edin. ed.).

FREE TRADE. In this article we give first a brief historical statement of the experience of the United States with reference to its alternate periods of free trade and protection. As this experience is seen abundantly to justify the latter policy as most conducive to the interests of the nation, we then proceed to reply to various theoretical arguments which have been brought forward by those who advocate free trade as the only proper system of international intercourse.

A. *Historical Review.*—Upon the opening of the ports after the war of the Revolution, an immense quantity of foreign manufactures was introduced and the people were tempted by the sudden cheapness of imported goods to purchase beyond their capacity for payment. The bonds of men whose competency to pay their debts was unquestionable could not be negotiated but at a discount of 30, 40, and 50 per cent.; real property was scarcely vendible, and sales of any article for ready money could only be made at a ruinous loss. Property, when brought to sale under execution, sold at so low a price as frequently to ruin the debtor without paying the creditor. A disposition to resist the laws became common. Laws were passed by which property of every kind was made legal tender in the payment of debts, though payable according to contract in gold and silver. Other laws delayed payments, so that of sums already due only a third, and afterwards only a fifth, was annually recordable in the courts of law. Silver and gold departed to pay for the necessary and unnecessary articles imported. In this condition of financial matters the public securities fell to 15, 12, and even 10 cents on the dollar, ruining a large portion of the warmest friends of the Revolution, who had risked their lives and embarked their entire property in its support. In every part of the States the scarcity of money had become a common subject of complaint, and the difficulty of paying debts had become so common that riots and combinations were formed in many places and the operations of civil government were suspended.

Such is the description given by contemporary writers: see Dr. Hugh Williamson, Minot's *History of the Insurrection in Massachusetts*, Marshall's *Life of Washington*, Ramsay's *South Carolina*, and Belknap's *History of New Hampshire*.

This, for several years, had been the experience of the country, when, under the administration of Washington, a report by Alexander Hamilton enumerated the principal circumstances from which may be inferred "that manufacturing establishments not only occasion a positive augmentation of the produce and revenue of society, but that they contribute essentially to rendering them greater than they could possibly be without such establishments." "These circumstances," continued the report, "are, 1. The division of labor. 2. An extension of the use of machinery. 3. Additional employment to classes of the community not ordinarily engaged in the business. 4. The immigration from foreign countries. 5. The furnishing greater scope for the diversity of talents and dispositions which discriminate men from each other. 6. The affording a more ample and various field for enterprise. 7. The creating in some instances a new, and securing in all, a more certain and steady demand for the surplus produce of the soil." This last was emphasized as "among the most important. It is the principal means by which the establishment of manufactures contributes to an augmentation of the produce or revenue of a country, and has an immediate and direct relation to the prosperity of agriculture." . . "It is evident that the exertions of the husbandman will be steady or fluctuating, vigorous or feeble, in proportion to the steadiness or fluctuation, adequateness or inadequateness of the market on which he must depend for the vent of the surplus which may be produced by his labor, and that such surplus, in the ordinary course of things, will be greater or less in the same proportion." . . . "For the purpose of this vent a *domestic market is greatly to be preferred to a foreign one;* because it is, in the nature of things, far more to be relied on." . . . "*To secure such a market there is no other expedient than to promote manufacturing establishments.* Manufacturers, who constitute the most numerous class, after the cultivators of the land, are for that reason the principal consumers of the surplus of their labor." . . . "This idea of an extensive domestic market for the surplus product of the soil is of the first consequence. It is, of all things, that which most effectually conduces to a flourishing state of agriculture."

Such were the arguments which induced the administration of Washington to favor protection to manufactures. The duties were quite inadequate for protection; but this fact, as well as the necessity of encouraging manufactures, was thrown into the shade by the immense demand for our exports which accompanied the wars of the French revolution and of the empire. Then came the period of non-intercourse, embargo, and war with England, ending with 1815, during which our manufactures increased immensely only to be in a great measure destroyed with returning peace. Then came years which resembled closely those which followed the war of the Revolution. The situation was such as forced from Gen. Jackson in 1824 the exclamation, "How and where shall the American farmer find a market for his surplus?" and the conclusion arrived at was the same that Alexander Hamilton had come to in 1791—that he must find it at home, by promoting American manufactures and the allied mechanical arts. Hence the tariffs of 1824 and 1828—followed by years of great prosperity.

But in 1833 the Southern States, which, under the slavery régime, were unable or unwilling to engage in manufactures, caused the tariff to be reduced, and in the ensuing panic of 1837 the lessons of 1786 and 1820 were learned anew, and it became apparent that the farmer absolutely requires the custom of the home manufacturer and mechanic, and that this custom can only be rendered safe by duties sufficiently high to prevent foreign competition, not so much in ordinary times as during periods of financial disturbance abroad. It was seen that any other policy would be as unwise as it would be for Holland to build her dikes only high enough to exclude the ocean in ordinary tides, preferring occasional submergence to a somewhat more expensive security. Nay, it was seen to be even less wise, inasmuch as the higher duty does not entail higher prices; *these* with regard to such goods as concern the great body of the people being determined by internal competition. They will be as low as they can be under the circumstances of the country, whether the duty be 20 or 60 per cent.—indeed, the higher duty would be more effectual in lowering the cost by giving a greater sense of security, and thereby attracting more capital to the industry. The pernicious experiment of 1837 and subsequent years convinced the people of these truths, and the tariff of 1842 was followed by a period of prosperity. Then came another change in 1846, in which it was decided to cut a foot or two from the top of the dikes; but the stupendous change wrought upon the whole industrial world by the gold discoveries in California and Australia kept the tides within bounds until 1857–60, when another submergence seemed imminent. Then came the civil war and the Morrill tariff. This carried us through the war and its expenditure of over $4,000,000,000; this warded off any collapse similar to those which followed the war of the Revolution, the war of 1812–15, and the collapse of 1837–40, and this gave us eight years of unexampled prosperity until 1873; then a too violent contraction of the currency suddenly throttling a patient in whom the arteries were beating with unusual energy, brought on a panic and a subsequent period of distress and depression. Such occurrences are not altogether avoidable in the present state of our knowledge; but that of 1873 was a far milder case than that of 1837 in the judgment of men who saw them both, and very much milder than those of 1786 and 1820 if we may judge by the contemporary records of those times.

The objects for the promotion of which Hamilton recommended protection in 1791 have all been most efficiently promoted. Such was the predicted result. Such is the result which is seen to have come to pass. The fact is indisputable; but nevertheless those who believe in free trade reply that the events predicted have come to pass, not in consequence of protection, but in spite of it; that the science of political economy demonstrates that no such results could issue from such a cause; that, on the contrary, still greater results would have come to pass under a régime where restriction had no place.

B. *Examination of Arguments for Free Trade.*—Here then we are forced to examine the propositions by which the theory of free trade is supported.

I. It is argued that a protective system is only another form of the mercantile system, which last is alleged to have maintained that the only wealth is gold and silver, and *for that reason* to have watched over the coming and going of treasure, as affected by the balance of trade, with a needless anxiety. It is urged that, as pots and pans are instruments for cooking, so gold and silver are instruments for the exchange of values; that, if more food were produced, a part of it could be exchanged for more pots and pans; and, if more commodities were produced, a portion of these could be exchanged for more gold and silver by which to carry on exchanges among the rest; that no country which has anything to give for either pots and pans, or for gold and silver, will be long without either.

By protectionists this argumentation is not accepted. It is urged in reply that, if anybody ever did suppose that gold and silver alone were wealth, nobody, at all events, supposes so now; but, on the other hand, nobody questions that so long as nations use them as the basis of the machinery of exchange, so long their coming and going will be a matter of vast importance. When they are flowing in, debts are more easily paid, credit more readily transfers capital into hands able to use it advantageously, and the population is more fully employed; first, in converting floating capital into those instruments of production and convenience needed by the continually increasing population, and secondly, in producing additional commodities to supply the augmented demand attending augmented employment. When they are flowing out, the reverse happens in every respect; and when they flow out in excess, one of those panics ensues which keeps for years a vast mass of men and women either partially or absolutely without work, and causes an aggregate of human suffering which entitles such a period to be named with war, pestilence, and famine, in the catalogue of the miseries of mankind.

Pots and pans are instruments; so also are gold and silver! It is easy to find a common name which may be applied to both; shall we then conclude that whatever is true of one class is true of the other? The practical man knows without any argument that, while a growing scarcity of pots and pans has no influence in producing a scarcity of food, a growing scarcity of gold and silver has a most marked influence upon the production of the commodities to be exchanged. The great merchant or banker, so far from being imposed on by the pot-and-pan theory, is even impatient with any one who wastes time in refuting it. The Bank of England to-day watches and governs the out-flow of gold with daily and hourly solicitude, although as a great exporter of manufactures England has comparatively little to apprehend from such a movement. Four times within a century the people of the United States have had experience of the effects of such an out-flow; and although theoretically it is true that the scarcity of gold, by rendering commodities cheap, brings back in time the amount which departed, yet, in the meantime, the industry of the country receives a check, the effects of which may endure for years.

II. It is argued that protective laws establish *monopolies*, by which one class of the community is enriched at the expense of the rest. But Adam Smith himself says (*Wealth of Nations*, Book I., chap. x.), that "if in the same neighborhood there was any employment evidently more or less advantageous than the rest, so many people would crowd into it in the one case and so many would desert it in the other, that its advantages would soon return to a level with other employments." Other great economists lay down the same doctrine; and the use of the term monopoly, with respect to industries in which many millions of people are free to enter, seems to show little regard for the intelligence of the reader. Moreover, if there be or should be any industries in which combinations can be made to effect a monopoly, these clearly are the very industries which a nation should possess for itself: because, if the existence of a monopoly be clearly established, the remedy is at hand. A reduction of the duties will keep profits within bounds; but if the monopoly exists abroad we are helpless.

III. A third argument upon which great reliance has been placed is, that industry is limited by capital, so that a protective law which caused capital to be employed in one industry must of necessity have prevented it from being applied to some other. But every industry was commenced because it would yield a satisfactory profit, and the same motive must cause its increase until its products overload the market, bringing down prices and profits and locking up capital in unsold stocks of commodities. Some stock is convenient, in order to meet readily the fluctuations of demand, but the tendency is to go beyond this point; and every stock, whether great or small, is unemployed capital—capital which may be drawn upon to carry out any new undertaking. If a war is to be waged, or a great augmentation of the normal construction of instruments of production or convenience (that is, of fixed capital) be undertaken, in either case the food, clothing, and implements in stock furnish the means. The war or the industrial movement diminishes these stocks, raises the price of the commodities, and stimulates the industries to greater activity. So, too, when a new industry to which a protective law insures the usual profits is introduced, there is a greater demand for the products of the old industries. They are stimulated—not depressed; and their greater activity speedily reproduces the floating capital which is at first converted into mills, forges, or machinery. This must be the effect while the fixed capital necessary for the industry is being formed. Afterwards, if the price of the protected commodity be raised, there are evidently two possible cases. The consumption of the commodity may be diminished more or less than one-half. If it be diminished mo rethan one-half, the gross annual product, which is the same thing as the aggregate of net individual incomes, will be lessened: if it be diminished less than one-half on the contrary, the annual product will be increased; and, if there be no diminution of consumption, the annual product will be increased by the amount of the whole value of the commodities, of which the manufacture has been newly introduced. Here we see at once the fallacy of the dogma, which declares that "if there would be a manifest absurdity in turning towards any employment thirty times more of the capital and industry of the country than would be necessary to purchase from foreign countries an equal quantity of the commodities wanted, there must be an absurdity, though not altogether so glaring, yet *exactly of the same kind*, in turning towards such an employment a thirtieth or even a three-hundredth part more of either." Had industry been limited by capital, as Adam Smith and J. Stuart Mill supposed, the argument would hold; but the moment we discover that in an industrial community normally there is unemployed capital, the premises are changed. Hereafter we see that industry and capital also are limited by the *field of employment*, and this with imported articles includes only the value of the exports, with which the imports are purchased; but with home manufactures it includes the values at each end of the exchange. If then the desire for pineapples or for wine be gratified through commerce, the taste for those articles will cause a production of values to the extent of the cost of the exports with which they are bought. Offer home products obtained with thirty times the expenditure of labor and abstinence, and the consumers will decline to purchase altogether; offer the same products raised at home by one-thirtieth or one three-hundredth part more labor, and the consumers will not diminish but rather increase their demand, for there will be *more able to buy*. The producers of pineapples and of wine will be themselves in condition to consume. That portion then of the field of employment which grows out of the desire for pineapples and wine will in such case be more than doubled, for the consumption of them will be rather increased than diminished even at a slightly higher price, and the commodities which would go abroad in order to procure them through commerce will be consumed at home. Adam Smith's argument then is erroneous in respect to all communities where there is unemployed capital and unemployed labor; and he himself teaches that there is always unemployed labor where there are rent and profits. (See Book I., chap. vi.)

Beneath the *field of employment* and limiting it lie the tastes and desires for the gratification of which the community is willing to work and save. Because the desires of an individual are seen to be never satisfied it has been argued that commodities can never be in oversupply. But commodities are not alone exchanged for commodities and are not the only objects of desire. In the United States (where the population and the gradual extension of the scale of expenditure (caused by new commodities and new services) equals at least 3 per cent. a year) there must upon the average be about one-seventh part of the annual product of commodities passed over to the constructors of instruments of production and of convenience, the possession of which will give a claim upon the increasing annual production of the future. Here commodities are not exchanged for commodities but for fixed property—a vast movement averaging perhaps $1,000,000,000. During periods of confidence and of excitement the call for commodities to satisfy this desire of the savers to better their condition may be much enlarged, and the excitement may extend over a number of years, causing a permanent augmentation of the demand for commodities; it may rise perhaps to $1,500,000,000 a year, accompanied by very full occupation of the population and a very large consumption; but the moment the community is smitten with discouragement—with a conviction that the business of constructing fixed capital has been overdone—the annual demand for commodities to gratify this desire may descend possibly to $500,000,000, with consequent want of employment and a consequent diminution of consumption. Everybody in practical life perceives under such circumstances that the productive energies which had adjusted themselves to satisfy the effective demand of a fully occupied population are in excess where the work to be done is diminished.

The field of employment is limited by the aggregate of the desires which find means of satisfying themselves, and in a community where the division of employments is established, when one desire finds its means of satisfaction impaired the general demand for commodities is curtailed. This accounts for the alternations of periods of very full and of very diminished employment. The effective demand for shoes, for instance, comes from the labor (of every description, both productive and non-productive) which finds a field of employment in satisfying the other desires of the community; and foremost among these other desires is the desire to acquire permanent incomes or a title to a share in future annual products; and this desire can be gratified only to such an extent as the annual product is increased, through the aid of the instruments of production and of convenience constructed directly or indirectly by the savers.

All practical men know that it is possible for the construction of every kind of fixed property to be overdone; overdone to such an extent that the aggregate income it yields does not satisfy the effective desire of accumulation which exists in the country. They know that, when such an event occurs, there must for several years be a diminution of work in this the largest single division of the field of employment, and that a diminution in this necessitates a similar movement in all the other divisions.

IV. A fourth argument which has been urged depends upon the doctrine of international trade. It is argued that the products of the mechanical and manufacturing industries cost the citizens of the United States as much labor and abstinence or nearly as much as they cost the inhabitants of Europe, while the products of agriculture cost us say only two-thirds (in labor and abstinence) what they cost abroad. and that by purchasing the former, which may be denoted by M., with the latter, denoted by A., we may obtain for the same effort half as much more of M. But this is not a universal proposition. It is true only so long as the foreign demand for our A. is equal to our demand for their M. Under our present system we have succeeded in producing say $6,000,000,000 M., and with $700,000,000 A. we purchase abroad tea, coffee, sugar, spices, etc., and such of the fine manufactures as we have not yet learned how to produce. Between ourselves the emoluments of the different employments are equalized with precision if we take an average of years. Between ourselves and the outer world the terms of exchange may be more favorable if we make for ourselves the necessity of buying and selling comparatively little, or it may be less favorable if we put ourselves under the necessity of buying and selling much.

If we now purchase $700,000,000 abroad at an exchange of two-thirds A. for M., it seems as if we might obtain say $300,000,000 more M. for $200,000,000 A. But to sell $1,000,000,000 raw products abroad in place of $700,000,000, we must offer our whole body of exports at a lower price. If there ensue a decline of 20 per cent., then to purchase $1,000,000,000 would require what before was selling for $1,250,000,000. Our $300,000,000 additional imports would then cost $550,000,000 instead of $200,000,000 as expected. At a difference of only 10 per cent. they would cost $400,000,000. The loss would appear to fall upon the producers of raw products chiefly; and it could not stop even at the point named, for the price of what was sold at home would be also diminished. Nor would this necessarily be all. The foreign market might refuse to receive our products to the extent of $1,250,000,000, and prefer to take payment for $100,000,000 or $150,000,000 in the treasure we had succeeded in accumulating while we were obtaining the additional $300,000,000 by our own industry. We should then enter upon one of those periods during which the foundations of our machinery of exchange are gradually being sapped; during which all debts, public and private, become daily more onerous; during which productive industry at each conversion of materials finds itself confronted with loss; and which ends, in the words of Mr. McCulloch (when speaking of 1837 and 1842), "in reducing the country almost to a state of barter, producing a universality of bankruptcy and distress that has no parallel, except perhaps in the denouéments of the Mississippi and assignat schemes in France." Moreover, when our treasure had been so far diminished that no more could be sent abroad, we should be forced *to go without* a portion of the supplies formerly derived from our own industries. After some years, we should discover the futility of endeavering to satisfy from abroad a larger proportion of our needs than will balance the foreign demand for our own products; then the industries would respond to renewed protection; we should construct anew the fixed capital which had gone to decay; we should purchase back, at a higher exchange, the treasure unwisely exported; and after years of misery the country would recover from the effects of a ruinous experiment, which each generation seems eager to repeat for itself.

V. A fifth argument is drawn from analogy. The tailor, it is said, does not make his own shoes, but purchases them with a part of the money which he obtains in the pursuit of his own trade; in which he has a manifest advantage. But the tailor who could find occupation for only a portion of his time would do well to make his own shoes also; and a nation is always in this position. Rent and profit enter into the cost of the great majority of commodities, and are expended partly in supporting the idle and the renderers of services which can be dispensed with. An industrial nation has always both capital lying unused and labor which is not employed in production. Whatever can be produced by these will be clear gain to the nation.

VI. A sixth argument is drawn from the assumed identity of individual and public interests. This was examined and disposed of by John Rowe half a century ago; but it continues, nevertheless, to form one of the main dogmas of free trade. It is represented that free trade simply permits individuals to trade, and that they will cease doing so whenever it becomes unprofitable. But this quietly assumes, without a particle of proof, that what is profitable to the individual must be at the same time profitable to the nation. But if the United States should undertake to satisfy from abroad a larger portion of her desires than balanced the desires of the outer world for her products—as above imagined—the merchants who conducted the exchanges might make their profits and grow rich, while their country was gliding towards the abyss of bankruptcy. They did this at the commencement of the similar movements which followed the war of the Revolution, the war of 1812–15, and the reduction of tariff in 1835–36; and those among them who foresaw the approaching disaster and withdrew in time retained their wealth. The greater portion however were excited by their first success, enlarged their operations, and were overwhelmed in the common ruin. But this only showed that they were by no means better able to judge as to what was for their own interests than "any statesman or lawgiver whatsoever." We may find similar examples in foreign countries. Let us take one from Portugal. In 1703 she was persuaded by the English minister, "that nations who would not buy could not sell—that free buyers were free sellers—that it was better for her to give up attempting to manufacture for herself, and purchase what she required by means of wine, in the production of which she had a natural advantage." She was convinced, and bound herself by the Methuen treaty. This brought about the ruin of her manufactures; after which, as the British merchant grimly describes it, "We brought away so much of their silver as to leave them very little for their necessary occasions, and then we began to bring away their gold." But each cargo of British manufactures gave a profit to the importing merchants. Their interests were promoted, but the interests of the country were sacrificed; and Portugal has remained wretchedly poor from that day to this. According to Mulhall she produces a value of $40 a year for each inhabitant; while France produces $125, and the United States $140. There is not then a particle of evidence that every individual can judge as to his own interests better than any statesman or lawgiver could judge for him, nor a particle of evidence that his own interest (even if he did know it) would be the same as the interests of his country. On the contrary history is full of instances in which individuals mistake their own interests, and also of cases where, though promoting their own interests, they injure that of the country to which they belong.

It is the interest of the nation that fish and game should not be taken or hunted at the breeding season, but it is the immediate interest of each individual to take or hunt these, while the rest of the community abstain; it is the interest of the nation to derive a portion of its revenue from taxes on vanity or ostentation—to sell to vanity that expensiveness which gives the appearance of being rich. Such taxes cost nobody anything; but each individual will evade them if he can.

The nation which produces more of agricultural products than the outer world is able or willing to buy at a fair price has no choice, if it would be wealthy, but to exclude so much of foreign products as will enable it to retain a sufficient metallic basis for its machinery of exchange; and the same is true of the nation whose products salable abroad are not sufficient to pay for whatever else it needs.

Portugal can sell abroad wine only to the value of $1.25 per capita of her population. It was a miscalculation in her to expect to be able to purchase through that article a sufficiency of even cotton and woollen clothing alone, for these in wealthy countries like the United States cost ten times the value named. But the individual trader doubtless made a profit by carrying on the exchanges which ought to have been suppressed.

VII. A seventh argument is, that every man has a right to spend his wages, salary, or income wheresoever he pleases; to exchange his products with anybody anywhere. This proposition regards the rights of property. If it were decided one way or the other, the decision would throw no light upon the question of "how shall the nation become wealthy." Nevertheless, as the argument finds favor with many who do not see its inapplicability to the question, it may be well to record some of the reasons outside of political economy for rejecting such an argument. We claim that both reason and experience have demonstrated that the American people can satisfy their wants from abroad only to an extent which is limited by the foreign demand for our products; and that, to obtain opulence, we must produce by far the greater portion of our commodities at home, and that to do this it is necessary to exclude foreign competition with the certain home industries. In this way the American people can secure abundance, and they cannot secure it by buying a few things at a cheap price, and going without the rest. We have acted upon this system and achieved a success which is the wonder of the world, and which has given to every class unparalleled prosperity; and this arises, we think, solely from the fact, that for nine-tenths of our requirements we buy of one another, restricting our foreign purchases to the tea, coffee, spices, etc., which we cannot produce, and to those finer kinds of manufactures which luxury and ostentation will have at any cost. These last we tax with a heavy duty—enough nearly to pay all the expenses of the general government. But this seems unjust to many whom a real or supposed social necessity compels to purchase articles brought from abroad; they think they ought to enjoy not only that share of the general prosperity which demand and supply allot, but also the right to spend their salaries or incomes where they please. A likes to be employed at a high emolument by B, C, D, etc., but does not like employing them in turn. But B, C, D, etc., reply—"Under our system we all prosper, yourself included: under your system we believe all would be impoverished, yourself not excepted." "We, the fifty millions, have a right to say under what conditions A shall share in our prosperity. If he does not like them, he can depart out of our thriving society, and this is the alternative which every moralist from Socrates down has accorded. A may not remain among us, and overrule the rest of the fifty millions in a matter of political economy."

VIII. An eighth argument is drawn from a juggle with the word "obstacle." It is shown that *some* obstacles to exchanges are also obstacles to opulence, and from this undistributed premise is drawn the distributed conclusion that all obstacles to exchanges are obstacles to opulence! Because the United States can sell and buy abroad with advantage to the extent of x, it is assumed that they can do so to the extent of

$x + \frac{1}{2} x$, although every attempt to do so has run the country in debt, stripped it of the tools of exchange, and brought on the most deplorable disasters. This is akin to the argument with regard to the identity of individual and public interests. As they are seen to coincide in some cases, they are assumed to do so in all cases, in spite of the most absolute proofs, both deductive and inductive, to the contrary. Such is the logic of free trade as it has appeared to a large part of the American people; but to use such logic

"Non homines, non dî, non concessere columnæ."

Let us sum up the case in a few words. The administration of Washington urged upon the people the protection of manufactures for reasons which were set forth in the *Report of Alexander Hamilton, Secretary of the Treasury*, Dec. 5, 1791; and, whenever this policy has been followed, a very marked prosperity has obtained, with the single exception of 1873–79, when other causes overcame for a time the effects of protection; but those who favor free trade maintain that inductive reasoning is utterly powerless to deal with such questions; that deductive reasoning alone is adequate; and that, although Hamilton's reasoning was deductive, yet it could not have been correct, inasmuch as it led to conclusions at variance with those of free trade. The protectionists then take up one after another the opposing propositions, and show them either to be based upon false premises or to involve logical mistakes of the very worst description, such as the mistaking a part for the whole; the changing of premises in the course of an argument; the reasoning from a conclusion, true in a limited sense and under certain definite circumstances, as if it were true universally under all possible variation of circumstances. We show, in short, a body of doctrine based upon deductive reasoning, and we show its verification by events; and we show that the counter propositions of free trade are in violation of every one of the canons of reasoning which were demonstrated by Aristotle and have been accepted by each succeeding generation for more than two thousand years. (G. B. D.)

FREEZING, the congelation of liquid substances, through reduction of temperature or pressure. The term is mainly applied to the solidification of water, but is also used occasionally with reference to substances which are liquid or gaseous at ordinary temperatures. In addition to congelation from natural causes there are many methods known through which a great degree of cold can be artificially produced, and highly resistant substances congealed. These methods are of practical use in the artificial production of ice, in the freezing of ice-cream and other substances, in artificially chilling the atmosphere, etc. In the liquefaction of a solid, the evaporation of a liquid, or the expansion of a gas, heat is always absorbed from surrounding substances, the latter being chilled. If, in addition to this, a great pressure be exerted on the surface of the chilled substances, the most obdurate gases may be congealed. By such a process oxygen and nitrogen have been liquefied, and even hydrogen is said to have been frozen or solidified.

The simplest method of applying the principle here indicated is the chilling of water through its natural evaporation. This is practised in India and China, the rapid evaporation from shallow pans of water, or from the surface of porous water-jars, absorbing sufficient heat from the remaining water to chill it. Another method of producing the same effect is to greatly compress air or some other gas, cool the vessel containing it, and then suffer it to suddenly expand by removal of the pressure. A considerable chilling effect results. In the many ice-machines now in use the evaporation of some highly volatile liquid is the method employed. Ammonia or the more volatile ethers are used for this purpose. Thus ammonia may be liquefied, or even solidified, by the pressure of its own vapor. If the pressure be then removed the liquid ammonia rapidly evaporates, and absorbs so much heat as to freeze the water in contiguous vessels. In ice-machines, however, the evaporation is usually made to produce its chilling effect upon brine, which flows easily around the water vessels, and congeals their liquid contents. Several methods of producing this effect were known prior to 1850, but the first commercially useful ice-machine was patented in that year, by A. C. Twining, an American inventor. Since then many improvements have been made, the efficiency of machines greatly increased, and the cost of artificial ice lessened, so that it bids fair, ere long, to compete successfully in price with natural ice, even in cold regions.

Of the several volatile liquids employed in ice-machines sulphurous acid, which first came into use in 1876, in the Sictet machine, seems the best. It produces a very intense cold, at a less cost and less injury to the machine than most other agents employ, and it is claimed to be capable of yielding merchantable ice at a cost of one cent per pound. This machine, in which can be used at will sulphurous acid, anhydrous sulphurous acid, sulphurous oxide, or sulphurous anhydride, has come largely into use to make ice for skating-rinks, breweries, etc. But the most recent and in many respects the best system of producing cold artificially is claimed to be the *binary absorption* system of Tessié du Mothay and A. J. Rossi. This is founded on the fact that the ethers formed by the acids, as well as their alcohol radicals, will absorb sulphurous anhydride, some of them to 300 times the volume of the gas employed under certain conditions. In this absorbing power ordinary ether stands first. The liquid employed consists of ether saturated with sulphurous oxide gas, or *Ethylo-sulphurous-dioxide.* This liquid, at temperatures of 60 to 65° Fahr., exerts no pressure. Thus a machine charged with it shows no pressure on the gauges, while with other agents the machines, even when not working, show a pressure which may increase so as to injure the working parts of the apparatus. This liquid, when evaporated under a vacuum, is resolved into its constituents. If afterwards the mixed vapors be subjected to a slight pressure the ether readily liquefies. This absorbs the sulphurous oxide vapor, and the binary liquid is restored. By this means is avoided the strong pressure necessary to liquefy sulphurous oxide when used alone, and a less power and strength of machine become possible. With the advantage of the low pressure of the ether is combined that of the intensity of the cold produced by the volatilization of sulphurous oxide, while the latter acts as a natural lubricant, and no oiling of the working parts is necessary. This removes one of the drawbacks to the ordinary employment of ether. In a machine using this agent, and making 6 tons of ice daily, the average pressure is about 15 pounds, varying from 10 to 23 as conditions grow favorable or unfavorable. This small pressure renders possible the use of simplified machines. The system has been brought into successful operation in the United States.

The great decrease of temperature by which the so-called permanent gases have been liquefied, and in some cases congealed, is produced by great vapor pressure in connection with the chilling methods above epitomized. The most efficacious method is said to be the employment of liquid ethylene as an evaporating medium. In vacuo the boiling point of ethylene is —238° Fahr. It may be liquefied by compression in tubes surrounded by ice, at a pressure of about 750 pounds to the square inch, or at a much lower pressure if a superior chilling process be employed. If it be now evaporated in vacuo in a cylinder surrounding a tube, in which is the gas to be acted upon, such a chill may be produced as to liquefy oxygen, nitrogen, and other highly resistant gases, and even to solidify some of these.

Freezing Mixtures.—In these the liquefaction of solids is the process employed. The best known and most commonly employed of such mixtures is a combination of snow or pounded ice and common salt, in the proportion of two parts of the former to one of the latter. In this mixture the action of the salt on the ice causes it to melt. The water produced dissolves the salt. This double liquefaction causes a considerable absorption of heat sufficient to reduce the thermometer from the freezing-point to —5° F. The process is largely employed in America in the manufacture of ice-cream, the freezing of fruits, etc. A reduction of temperature of more than 20° may be maintained for a long time by this means. Of the many other freezing mixtures known a few may be here presented:

Materials.	Parts.	Temperature reduced.
Snow or pounded ice	12	32° to —25°
Common salt	5	
Nitrate of ammonia	5	
Water	1	32° to —25°
Nitrate of ammonia	1	
Carbonate of soda	1	
Snow	3	32° to —23°
Dilute sulphuric acid	2	
Snow	8	32° to —27°
Hydrochloric acid	5	
Snow	7	32° to —30°
Dilute nitric acid	4	
Snow	4	32° to —40°
Calcium chloride	5	
Snow	2	32° to —50°
Crystallized calcium chloride	3	
Snow	3	32° to —51°
Potash	4	
Sulphate of soda	6	50° to —14°
Nitrate of ammonia	5	
Dilute nitric acid	4	
Phosphate of soda	9	50° to —20°
Dilute nitric acid	4	

(C. M.)

FRELINGHUYSEN, **Frederick T.** (1817–1885), an American lawyer and statesman, was born at Milltown, Somerset co., N. J., Aug. 4, 1817, being a nephew and adopted son of Theodore Frelinghuysen. He graduated at Rutgers College in 1836, and was admitted to the bar in 1839. He was distinguished in his profession and was appointed attorney-general of the State in 1861. Soon after, being again called to that position in 1866, he was appointed U. S. senator to fill a vacancy, and continued to hold his seat until December, 1881, when he was called into President Arthur's cabinet as secretary of state. He endeavored to promote commercial intercourse by reciprocity treaties with Mexico, Nicaragua, and other states, and by a new treaty with Spain. Soon after retiring from office he died at Newark, N. J., May 20, 1885.

FRELINGHUYSEN, **Theodore** (1787–1862), an American statesman, was born at Milltown, Somerset co., N. J., March 28, 1787, being the son of Gen. Frederick Frelinghuysen (1753–1804), who had served with distinction in the revolutionary war, and afterwards was U. S. senator from New Jersey. He graduated at Princeton College in 1804, and was admitted to the bar in 1808. He was captain of a volunteer company in the war of 1812–15. In 1817 he was made attorney-general of the State, and held this position till 1829, when he became U. S. senator. He was a zealous advocate of the measures proposed by Henry Clay. His term expired in 1835, and two years later he was elected mayor of Newark, N. J. In 1838 he was appointed chancellor of the University of the City of New York, and removed to that city. In 1844 he was the Whig candidate for the vice-presidency, Clay being the candidate for president; but they were defeated. In 1850 Frelinghuysen resigned his position in New York to become president of Rutgers College, New Brunswick, N. J. He died at New Brunswick, April 12, 1862. Throughout his career he was prominent in charitable and religious enterprises, and for many years was president of the American Tract Society, temperance and Bible societies, and of the American Board for Foreign Missions. His life has been written by Rev. T. W. Chambers.

FREMONT, a city of Ohio, county-seat of Sandusky county, on the Sandusky River, at the head of navigation, 80 miles W. of Cleveland. It is on the Lake Shore and Michigan Southern, the Wheeling and Lake Erie, and Lake Erie and Western Railroads. The river is here crossed by four bridges. The town has a good local trade, 1 national bank, 1 savings bank, and 1 private bank; 1 daily and 4 weekly papers, a fine city-hall, the Birchard Library, 9 churches and 7 schools, 4 flouring-mills, 2 foundries, engine- and boiler-works, and manufactories of farm-implements, malt-extract, saddlery, harness, and other goods. It has gas- and water-works, and four parks. The public debt is $175,000. The city limits bound a tract of 2 miles square, and the situation is attractive—the city rising upon the hills on either side of the river. Here was Fort Stephenson, where Col. Croghan, in 1813, made his gallant defence against the British and Indians. In 1816 Croghansville was settled on the E. bank, and in 1817 Lower Sandusky was built on the W. side. In 1840 both were incorporated under the name of Lower Sandusky, and in 1846 the name was changed to Fremont. Population in 1870, 5455; in 1880, 8446.

FREMONT, **John Charles**, an American explorer and general, was born at Savannah, Ga., Jan. 21, 1813, being the son of a French immigrant. His mother, left a widow in 1818, settled at Charleston, and her son John was educated at Charleston College. He afterwards taught mathematics, and became a civil-engineer on railroads in the Southern States. In the winter of 1837 he assisted in the military reconnoissance of the Cherokee country in Northern Georgia. He next engaged in the exploration of the Great West, and was thus brought in close contact with Col. Thomas H. Benton. The lieutenant fell in love with the senator's daughter, Jessie, then only fifteen, and was secretly married to her Oct. 19, 1841. Having gained the approval of the government for a thorough exploration of the Rocky Mountain region, in the summer of 1842 he explored the South Pass. The highest peak of the Wind River Mountains being then ascended by him, received the name of Fremont's Peak. The report of this expedition, soon after laid before Congress, established his fame as "the Pathfinder." He now extended his plans of exploration to cover the unknown country beyond the mountains to the Pacific coast. In May, 1843, he started on a new expedition, aiming to reach Oregon by a new route south of the one formerly pursued. In September he arrived at the Great Salt Lake, then imperfectly known. He then crossed to the headwaters of the Columbia, and descended its valley to Fort Vancouver. Returning in November by a more southern route his party was enclosed in a barren region, with little possibility of escape, in the depth of winter. Without guides he crossed the Sierra Nevada, and in March reached Sutter's Fort, on the Sacramento River, in time to save his men, though half of his mules had perished. Undaunted by past perils he returned to explore the desert basin, which was afterwards called by his name. He finally reached the Missouri in July, 1844, and was rewarded for his heroism with a brevet-captaincy. On a third expedition he explored more thoroughly the region which he had discovered, again crossed the Sierra Nevada in winter, and pushed on to Monterey, then the Mexican capital of Alta California. Gen. Castro immediately ordered him to depart from the country, and on his refusal preparations were made for an attack on his little force of 62 men. After a siege of four days Fremont withdrew unmolested, and pushed his way north into Oregon. But early in May, 1846, on account of despatches from Washington, he marched back to the settlements made by Americans on the Sacramento, which were now threatened by Gen. Castro. The settlers rose in revolt against Mexico and proclaimed their independence. Fremont, now lieutenant-colonel, was elected governor of California on July 4. Within a week word was brought that the U. S. fleet had seized Monterey. Fremont hastened thither with about 160 mounted riflemen, and found that Com. Stockton, who had arrived about the same time, had orders to conquer California. Stockton appointed Fremont military commandant and civil governor of the territory. But Gen. Philip Kearny, who also had similar orders to those given to Com. Stockton, arrived soon after, and a dispute ensued between Fremont and Kearny, which was decided in May, 1847, by orders from Washington assigning to Gen. Kearny the supreme authority over the territory. In June the latter returned to the East, ordering Fremont to accompany him, and when he arrived at Fort Leavenworth placed him under arrest and sent him to Washington. Here, being tried by court-martial, he was on Jan. 31, 1848, found guilty of mutiny and disobedience, and sentenced to be dismissed. Pres. Polk approved of the verdict in part, but remitted the penalty. Fremont immediately resigned, but in October following he organized an expedition for the purpose of finding a practicable southern route to California. This was the most disastrous of his expeditions. In his first attempt to cross the mountains all his mules and 11 out of 33 men perished; yet, after being obliged to return to Santa Fé, he renewed the attempt and finally reached the Sacramento in the spring of 1849. Being elected U. S. senator from California he went to Washington, where he took his seat in the Senate as soon as the new State was admitted, Sept. 10, 1850. His term expired in 1851, and as he had opposed the introduction of slavery into the new State he was defeated in the legislature when a candidate for re-election. After a year's visit to Europe, he organized a fifth expedition across the continent to explore the southern route to California. In 1847 Fremont had purchased in California the Mariposa estate, which was afterwards found to contain gold-mines. Lawsuits arose concerning the title, which were not settled until 1855, when the Supreme Court of the United States declared his title valid. He then settled in New York, and was engaged in literary and commercial operations.

The first National Republican Convention at Philadelphia, June 17, 1856, nominated Fremont as its candidate for President of the United States, and W. L. Dayton, of New Jersey, as the candidate for Vice-President. After an animated campaign, James Buchanan, the Democratic nominee, was successful. In the popular vote Buchanan had received 1,838,000 votes; Fremont 1,341,000; and Fillmore 875,000. Fremont afterwards went to California, and in 1860 again visited Europe. When the civil war broke out, Fremont was appointed a major-general in the U. S. army, and was assigned to command of the Western department in July. Reaching St. Louis July 25, he found the State of Missouri almost in the grasp of the Confederates. He issued a proclamation, Aug. 31, placing the State under martial law and declaring the slaves of those who took up arms against the United States free men. This proclamation was modified by Pres. Lincoln, as exceeding the terms prescribed by Congress, but great clamor was raised in many parts of the North for the removal of the general. On Nov. 2, when he thought he was about to secure a victory, he was superseded by Gen. D. Hunter. In the following February he was appointed commander of the mountain district, comprising parts of Virginia and Kentucky. Here he fought a battle at Cross Keys, with Gen. "Stonewall" Jackson, June 8, 1862, but the latter escaped during the night following. Soon after, when Major-Gen. Pope was assigned to the command of the Army of Virginia, Fremont, declining to serve under a general whom he outranked, sent in his resignation, which was accepted. He took no further part in the war. Towards the close of Pres. Lincoln's first term, some dissatisfied Republicans held a convention at Cleveland, Ohio, and nominated Gen. Fremont and Col. John Cochrane for President and Vice-President. The movement failed to obtain support, and the nominees retired from the contest before the election took place. After the war Gen. Fremont was made president of the Memphis, El Paso, and Pacific Railroad, which was intended to traverse the country he had explored in his later expeditions. He spent much time in Europe on its behalf, endeavoring to enlist the aid of European capitalists. But a few years later, the exposure of the transactions of the *Crédit Mobilier* in connection with the Union Pacific Railroad seriously damaged the credit of all such enterprises. The sole guarantee of the bonds which Gen. Fremont had placed on the Paris market was the grant of lands made by Congress, which, however, would not pass into possession of the company until the road was built. On a charge of fraudulent representations concerning them, suit was instituted against Gen. Fremont in Paris, and in his absence he was condemned to five years' imprisonment and a fine of 3000 francs. He denied all responsibility for the representations made by the brokers, but the failure of his projects reduced him to poverty. In June, 1878, he was made governor of Arizona, which position he held for four years.

FRENEAU, PHILIP (1752–1832), an American poet, was born in New York city, Jan. 2, 1752, of Huguenot descent. He graduated at Princeton College in 1771, having already written some poems of moderate merit. In 1776 he went to the West Indies on a trading voyage, and was afterwards engaged as a merchant. In 1779 he was a contributor to the *United States Magazine*, established by his class-mate, H. H. Brackenridge, in Philadelphia. In 1780 Freneau was captured at sea by the British, and suffered the horrors of a prison-ship in New York. In 1791 he was editor of the *Daily Advertiser* in New York, but being called to Philadelphia to be clerk in the department of state, he edited there the *National Gazette*, in which he assailed the policy of Washington. In 1793 he removed to New Jersey, where he passed his later years, with occasional visits to New York. He died at Monmouth, N. J., Dec. 18, 1832. A volume of his *Poems* first appeared at Philadelphia in 1786, his *Miscellaneous Works* in 1788, later *Poems* at Mount Pleasant in 1795, and two more volumes at New York in 1815. His early political burlesques are said to have cheered the patriots of the Revolution. His muse ranged over a great variety of subjects, and sometimes rose to a high strain.

FRÈRE, CHARLES THEODORE, a French painter, was born at Paris, June 24, 1815. He studied art with Coignet and Roqueplan, and first exhibited in the Salon of 1834. Two years later he went to Algeria, took part in the siege of Constantine, and afterwards visited the East. His works relate entirely to Eastern subjects. He has a studio in Cairo and another in Paris. Among his more famous pictures are the Halt of the Arabs, which was bought by the French government in 1850, A Harem at Cairo, Ruins of Karnak, The Island of Philæ, The Caravan of Mecca, The Nile—Evening, and The Desert—Noon.

FRERE, SIR HENRY BARTLE EDWARD (1815–1884), an English colonial officer, a nephew of John Hookham Frere (1769–1846), the celebrated wit and diplomatist, was born March 29, 1815. He was educated at Bath and at Haileybury College, and entered the East India Company's civil service in 1834. He was resident and chief-commissioner of Sinde from 1850 to 1859; was made a K. C. B. for services during the mutiny in 1859; was governor of Bombay, 1862–67; a member of the Indian council, 1866–74. In 1872 he was employed on a successful mission to Zanzibar for the suppression of the slave-trade of that sultanate. He was sworn of the privy council, 1873, and was made a baronet in 1876. He was governor of the Cape of

Good Hope and high commissioner for South Africa, 1877–80, and was charged with having brought on the Zulu war. Sir Bartle Frere was noted as a philanthropist and an active supporter of Christian missions. An earnest conservative in politics, he enjoyed the special favor of the Queen and of Lord Beaconsfield. His writings were chiefly on the missionary work, and on various philanthropic subjects. With his brother, W. E. Frere, he published, in 1871, the *Memoir of Hookham Frere*, prefixed to the collected works of the latter. He died in London, May 29, 1884.

FRÈRE, Pierre Edouard, a French painter, was born at Paris, Jan. 10, 1819. He studied under Paul Delaroche, and first exhibited in 1843. He painted the amusements and occupations of country children in a way to win the popular heart, and engravings of them were widely circulated. His numerous paintings show careful study and phenomenal success in transferring to canvas the unconscious grace of childhood. Among his works are The Little Gourmand, Boys Going from School, Girls Going from School, The Road to School, The Orphan's First Prayer, and Preparing for Church. The last is in the Corcoran Gallery at Washington.

FRÈRE-ORBAN, Hubert Joseph Walther, a Belgian statesman, was born at Liège, April 24, 1812. He received a French education, studied law, and was admitted to the bar in his native city. He was also active as a liberal journalist, and in 1847 was elected to the Chamber of Deputies. Being called to take charge of the public finances he exerted himself to avert a financial crisis after the Revolution of 1848, and organized the national bank of Belgium. Retiring in 1852 he was recalled in 1861, when he opposed the commercial treaty with France. However he remained in the cabinet, and in January, 1868, became its chief. In 1870 the clerical party prevailed and Frère-Orban became the leader of the opposition, the struggle between the two parties turning chiefly on the subject of education. In June, 1878, the liberals prevailed and Frère-Orban became head of the ministry, with the portfolio of foreign affairs. He established a special ministry of public instruction, and by the law of July, 1879, instruction was secularized. The bishops pronounced excommunication against those engaged in these schools, and after an ineffectual appeal to the pope the Belgian embassy to the Vatican was recalled. Frère-Orban maintained his position at the head of the ministry until 1884, when in consequence of the victory of the clerical party at the polls he retired.

FREYCINET, Charles Louis de Saulces de, a French statesman, was born at Foix, Ariéges, Nov. 14, 1828. He was educated at the École Polytechnique in Paris, and graduated in 1848. He was employed as an engineer on government works until 1855, when, being placed in charge of the railroads of the south of France, he thoroughly reorganized their system. He also published treatises on mechanics, mathematics, and railroad engineering. In 1862 his investigation of the systems of labor in France and other countries led to the amelioration of the condition of working-women and children in France. His work on hygiene, *Principes de l'assainissement des villes* (1870), is valuable. In 1870 Gambetta appointed Freycinet chief of the military cabinet at Tours. The fruitless attempt to prolong the struggle against the Germans was afterwards related by him in *La Guerre en province pendant le Siège de Paris* (1871). In 1876 he was elected to the Senate as a supporter of Gambetta, and proved an effective speaker. Even under MacMahon's reactionary administration Freycinet's executive ability caused him to be made minister of public works in December, 1877. The control of public affairs having passed into the hands of the Republicans on Dec. 27, 1879, Freycinet was made chief of the ministry, taking the department of foreign affairs. He did not fulfil the expectations which had been formed and in less than a year he was compelled to resign, Sept. 19, 1880. Gambetta, who had brought about the removal of his old friend and supporter, was for a short time chief of the cabinet. On his death Freycinet, the man of peace and compromise, was again called to the head of affairs, Jan. 31, 1882, and held this position about six months. By preventing France from taking part in the Egyptian war he lost favor with the Chamber of Deputies. A period of foreign aggression followed, but the enormous expense of such administration produced a reaction, and on Jan. 7, 1886, after the re-election of President Grevy, the peaceful and economical Freycinet was again called to the premiership.

FREYTAG, Gustav, a German poet and novelist, was born at Kreuzberg, in Silesia, July 13, 1816. He studied at the Universities of Breslau and Berlin, devoting himself especially to German philology, and was made Ph. D. in 1839. Becoming a lecturer on German literature at Breslau he published some volumes of narrative poems, and the dramas, *Die Valentine* (1847) and *Graf Waldemar* (1850). In 1848 he settled at Leipsic, where he edited the *Grenzboten* until 1870. His novel *Soll und Haben* (1855) had now placed him in the front rank of German novelists. In English it has appeared as *Debit and Credit* (1858). Another of his works, *Die verlorene Handschrift* (1864), has been almost equally successful. He began in 1859 a series of picturesque sketches from early German history, which were finally gathered into four volumes, entitled *Bilder aus der deutschen Vorgangenheit* (1862). Among his later works are *Ingo und Ingraban* (1872) and *Die Geschwister* (1878). Freytag is thoroughly imbued with the modern realistic spirit, yet he never loses sight of the necessity of grace in works of true art. His characters are lifelike, and his style graphic. In his dramas he attacks psychologic problems, but presents them with due regard to poetic probability.

FRIEDRICH Karl Nikolas, Imperial Prince of Germany, is the eldest son of Prince Karl (1801–1885), the second brother of Emperor Friedrich Wilhelm. He was born March 20, 1828, and received a military education, and when raised to command exerted himself to improve the morale of the army. He was engaged in the Schleswig-Holstein war in 1864, and in the war against Austria in 1866 had command of the First army. On his march through Saxony he won the favor of that people to the cause of Prussia. Entering Bohemia he pushed forward with such boldness that he compelled the Austrian general Benedek to retire to Sadowa. Here by the timely arrival of the Crown Prince Friedrich Wilhelm he gained the great victory which decided the war, and compelled Austria to sue for peace. In the war with France in 1870 he commanded the Second German army, amounting to 250,000 men and 500 guns. He defeated the French general Froissart at Speichorn on Aug. 6, and soon after drove Marshal Bazaine to take refuge in Metz. After a siege of ten weeks Bazaine surrendered his entire force of 150,000 men. The prince was then made a field-marshal. In November he marched against the Army of the Loire, which under Gen. Chanzy had revived the hopes of the French. The prince recaptured Orleans, took Le Mans, and drove Chanzy to the north, where he was unable to effect anything. The prince was married in 1854 to Marie Anhalt, daughter of the Duke of Anhalt, by whom he has four children.

FRIEDRICH Wilhelm Nikolas Karl, Imperial Prince of Germany and Crown Prince of Prussia, was born at Potsdam, Oct. 18, 1831. He is the only son of the Emperor Wilhelm. After receiving a scientific education he entered the military service and rose to the rank of general. In 1866 he had command of three army corps, with Major-Gen. von Blumenthal as his chief of staff. His army marched from Silesia through the passes of the Sudetic range, and after several severe engagements reached the field of Sadowa in time to decide the fortune of the day. In the war against France the crown prince had command of the Third German army, comprising about 200,000 men and 500 guns. On Aug. 4 he defeated part of Marshal MacMahon's force at Weissenburg, and on the 6th assailed his entire force of 50,000 men in a strong defensive position at Woerth. After a desperate struggle the French left and centre were completely broken. At the battle of Sedan, Sept. 1, the crown prince again fought with MacMahon, having crossed the river Meuse under specially difficult circumstances. After the battle he marched towards Paris and entered Versailles on the 20th. He took part in the siege of Paris and remained there till peace was declared. He was made a field-marshal of Prussia, and when his father was made Emperor of Germany he was styled Imperial Prince. He was married, Jan. 25, 1858, to Victoria Adelaide, Princess Royal of Great Britain, and has six children.

FRINGE TREE, also called *White Fringe* and *Old Man's Beard*, is the *Chionanthus Virginica* of Linnæus. It is a large shrub, about 10 or 12 feet high, though sometimes becoming a small tree of 20 or 30 feet. It belongs to the natural order *Oleaceæ*, to which the olive and the ash belong, and it is, indeed, intermediate between these two genera. Though very distinct from them in appearance, the descriptive characters closely approach. The flowers are cut into deep, narrow segments, as if made of white paper, and the corolla is rotate, while it is short, salver-form in the olive and generally wanting in the ash. The ash has male and female flowers on separate trees, or at least separate on the same plant, and there is a similar tendency in the white fringe, which often has some individual trees wholly barren. But the fruit is very different in appearance from that of ash, being a purple drupe, having a single stone in the centre, as in the olive. The flowers are borne in axillary slender, drooping panicles, giving the fringe-like character which is expressed by its common name. According to some authors it also bears the name "snow-tree," and the botanical name *Chionanthus* signifies snow-flower. Linnæus tells us he borrowed the name from Royer, a Dutch botanist, who, evidently referring to the species now known as *Chionanthus Zeylonica*, with which *C. Virginica* was once identified, says it was commonly called "sneebaum," or snow-tree. The appearance of *Chionanthus Virginica*, the only American species, would hardly suggest the name. Our snowdrop tree is a very different plant, the *Halesia*. The name *Virginica* is due to the fact that, like so many American plants with the same name, it was first made known to Europeans through the early collections of Clayton from Virginia. It is a comparatively local plant, being confined to the seaboard from Southern Pennsylvania to Florida.

Chionanthus Virginica (White Fringe).

For its rare beauty it is often cultivated in the gardens of the United States and of Europe. It is of no known use in the arts. The aborigines used the bark of the roots, bruised, and applied to obstinate sores and ulcers with very good effect, and an infusion of the roots is still employed with considerable effect in stubborn intermittent fevers. (T. M.)

FRITH, William Powell, an English painter, was born at Studley, Yorkshire, in 1819. His first picture appeared in 1839, and in the next year he exhibited, at the Royal Academy, Malvolio and the Countess Olivia. Many of his earlier works treated in the same way incidents from history and romance and were made widely known by engravings. He became an academician in 1853. In 1858 he achieved a great success with his crowded canvas representing the Derby Day, and another notable work of the same kind, The Railway Station, appeared in 1862. He still continues to depict scenes from Shakespeare, Scott, and others, combining genuine artistic ability with a popular range of subjects.

FROEBEL, Julius, a German politician and traveller, was born at Griesheim, July 16, 1805. He was the son of a clergyman and nephew of Friedrich Fröbel, the founder of the Kindergarten system of schools. He studied in the Universities of Munich, Jena, and Berlin. In 1833 he went to Zurich and was appointed professor of mineralogy in the high school there. Engaging in politics as an extreme radical, he resigned his professorship in 1844. In 1848 he was elected to the German Congress at Frankfort, and in October went with Robert Blum to Vienna to excite a revolution. He was arrested and condemned to death, but pardoned by Prince Windischgrätz. Returning to Frankfort he published an account of his attempt (1849). During his years of travel in Central America, Mexico, and California he was a frequent correspondent of the *New York Tribune*. In 1856 he married in New York the Countess Caroline von Armansperg, daughter of the Bavarian minister, and soon after returned to Germany as a naturalized American citizen. In 1862 he was in Vienna advocating by his writings the federal union of the German states. In 1867 he founded in Munich the *Süd-deutsche Presse*, which he edited until 1873. He was then made consul of the German empire at Smyrna, and in 1876 was transferred to Algiers in the same capacity. Among his noteworthy publications is *Theorie der Politik* (1861–64), to which he afterwards added *Die Geschichtspunkte und Aufgaben der Politik* (1878). Besides a German narrative of his travels he published in English *Seven Years' Travel in Central America and the Far West* (1859). He has also published *Die realistische Weltansicht und die utilitarische Civilisation* (1881).

See Vol. IX. p. 698 Am. ed. (p. 795 Edin. ed.).

FROG.—The term frog is commonly applied to two distinct groups of amphibians or batrachians, viz., the tree-frogs and burrowing frogs (*Arcifera*) and the true frogs (*Raniformia*). To understand the distinction between these it is necessary to examine the skeleton. In the former group the free diverging ends of the coracoid and pre-coracoid bones of the shoulder girdle are connected by two longitudinal cartilaginous bands with convex borders. These bands permit of a movement which expands and contracts the thoracic cavity. In the Raniformia these cartilages are fused into a narrow median mass which intervenes between the adjacent ends of the nearly parallel coracoid and pre-coracoid bones, the whole structure thus being solid and incapable of expansion and contraction. Tree-frogs, burrowing frogs, and true frogs agree in the possession of teeth, a character distinguishing them from the toads, which have the arciferous shoulder-girdle and no teeth.

The arcifera are grouped in the families Bufonidæ (see TOAD), Dendrophryniscidæ, natives of the Andes; Discoglossidæ, found in Europe, with one species in New Zealand; Cystignathidæ, an extensive family occurring in Australia and South America, Amphignathontidæ, Hemiphractidæ, and Hylidæ. The last family includes 175 species, most of them South American, though 23 inhabit North America, 20 Australia, and 2 the Old World continent.

One hundred and sixty species of Cystignathidæ have been described, exhibiting great variety in habit and structure, since some are burrowers, others climbers of trees and rocks, and others adapted for an aquatic life; while some of the forms have bony skulls and breast-bones, and others have these parts of the skeleton cartilaginous. Only a few of those with complete skulls have a bony sternum or breast-bone. Many of the species are of large size. *Cystignathus ocellatus* is the largest, attaining a length of eight inches.

The species of *Lithodytes* inhabit rocky regions, and are abundant north of the Isthmus of Panama, one species occurring in Southern Florida, while another lives in fissures in the limestone precipices of Western Texas. This species is supposed to deposit its eggs in pools of rain-water in the caverns and crevices of the rocks. During the breeding season it is very noisy. The inhabitants usually attribute the noise to a lizard (*Gerrhonotus*).

The genus *Hylides* lives upon the ground, yet has the ends of the toes dilated as in the tree-frogs. *H. martinicensis* is abundant in the West Indies. The eggs are laid between the leaves of living plants, or under fallen leaves or stones. Sometimes the frog sits on them. In about eight days the embryo frog is visible through the transparent substance of the egg, and looks almost like a small salamander. In fourteen days it leaves the egg, and in the course of another day the tail is absorbed. Thus the metamorphosis which in most frogs occupies so long a period is in this species passed through in the egg. The genus *Hylides* is distributed throughout tropical America.

The species of *Ceratophrys* are among the most curious of the family. They are toad-like in shape, and often have horn-like projections from the eyelids and from the muzzle, while some have bony plates set in the skin of the back.

In the genus *Telmatobius*, which inhabits high altitudes in the Andes, the organs of hearing are defective. One species lives in Lake Titicaca. *Pseudis* is remarkable for the very large relative size of the larvæ, and also for the extension of the web of the hind-foot upwards between the external metatarsals or bones of the sole of the hind feet. In most of the tailless batrachians these bones are closely bound together. The species are found in Brazil and southwards.

The family Pelobatidæ may be divided into two sections, the one European, the other North American, distinguished by the structure of the sacrum. The species of *Spea* inhabit the western part of the United States, and extend to the valley of Mexico. Living in an arid region, they take advantage of a summer rain to issue from their burrows and deposit their eggs in the puddles and pools. The larvæ hatch and acquire their legs quickly, and thus some at least become air-breathers in time to escape death by the drying up of their early habitat. *Spea hammondii* inhabits the Pacific region as far south as San Diego, while *S. bombifrons* lives in the central region, that is, in the area included between the Rocky Mountains and the Sierra Nevada. Prof. E. D. Cope found larvæ of this species, though still with toothless jaws and unabsorbed tails, devouring the dead bodies of the Western locust (*Calopterus spretus*). Most of the species of *Scaphiopus* are found in North-western Mexico and the adjacent parts of the United States, but *S. holbrookii* occurs throughout the Atlantic region. During the greater part of the year it is concealed underground, but in the breeding season (April or May) it appears above ground quite suddenly, and often in considerable numbers, and attracts attention by the loudness of its voice. "The wonder that so great a volume of sound can proceed from so small an animal disappears," says Dr. Abbott, "if we examine the vocal cords." The machinery for producing sounds to equal an ordinary steam-whistle is apparently contained in the throat of this rare and curious batrachian; although the males are most noisy the females are far from voiceless. Dr. Abbott watched the development of this species in the water of a sink-hole in a dry upland field near Trenton, N. J., and found that, notwithstanding the rapidity of their metamorphosis, the greater part of the eggs and newly-hatched larvæ perished by the drying up of the water, so that, if the spade-foot toads habitually lay their eggs in temporary pools, this habit accounts for their rarity. Several specimens were reared in confinement, and it was noted that the tadpoles with large tails and without front legs devoured their more advanced companions with smaller tails and budding front legs. At the latter stage the animal is more defenceless than before or after.

The Hylidæ, or tree-frogs, have the ends of the digits terminated by a disc-like dilatation, thus enabling them to climb. Some true frogs as well as certain Cystignathidæ have similar dilatations, but the structure of the terminal phalanges is different. Although called tree-frogs, many of them live upon the ground, frequently near water. This is the case with the species of *Chorophilus* and *Acris*. Seven kinds of the former genus and two of the latter occur in the United States, principally in the South. Some of the species of *Hyla*, as *H. pickeringii* of the Eastern States, have similar habits, and *H. regilla* of California is usually to be found among grass and herbage. In the genus *Triprion* of Mexico and Central America the ossification of the skull is carried so far that it forms a prominent rim, overhanging the mouth all around. *Triprion* is also exceptional in having a longitudinal row of teeth on the roof of the mouth. Many of the largest Hylidæ are included in the genus *Hypsiboas*, in which the fore-limbs have a thumb ending in a sharp curved spine, enabling the male to hold the female firmly. There is a similar arrangement in some Cystignathidæ. There are ninety-five species of *Hyla*, the largest of which, *H. vasta* of the West Indies, and *H. dolichopsis* of New Guinea, reach a length of five inches. *Phyllomedusa bicolor*, the giant of the family, reaches seven inches. Only one species, *Hyla arborea*, occurs in Europe.

The North American *Hylæ* lay their eggs in the water, in pockets smaller than those of the frogs, and attached to a plant or other fixed object. The young of the common *Hyla versicolor* are gray, and undergo metamorphosis while small. The adults can change their color to that of the object they are upon, passing from pale gray to bright green, and the species of *Acris* and *Chorophyllus*, as well as most Hylidæ, undergo similar changes. The first sounds of spring are the shrill notes of *Hyla pickeringii* and *Acris gryllus* from the swamps. A little later comes the rasping pipe of *Chorophilus triseriatus*. The colors of many Hylidæ are brilliant.

In the genera *Nototrema* and *Opisthodelphys* the eggs are placed upon the back, in a pocket formed by the infolding of the skin which is pushed inwards from the posterior part of the back. This pouch may, when extended with eggs, cover almost the entire dorsal region.

In *Nototrema marsupiatum* the young leave the pouch as tadpoles, but in some other species of this genus they pass through all the stages of their metamorphosis in this position.

The Gastrechmia are a sub-order consisting of only two or three species of African frogs, distinguished by the articulation of the shoulder-blade to the skull. The great firmness of the scapular arch produced by this arrangement, united as it is with the structure of the shoulder-girdle found in the true frogs, enables these species to burrow deftly.

The Firmisternidæ comprise five families, viz.: the Dendrobatidæ of tropical continental America and Madagascar; the Phryniscidæ of the same regions, and also found in Malaysia and New Guinea; the Engystomidæ, common to both continents; the Dyscophidæ, and the extensive family of Ranidæ or true frogs. Sixteen out of the twenty-two species of Phryniscidæ are from tropical America. *Brachycephalus ephippium* is a small bright yellow species common in some parts of Brazil. It looks like a small toad, and has a saddle-like bony plate on its back. *Engystoma carolinense* of the Southern States is the only species of its family found in this country. *Cacopus* and *Glyphoglossus*, Asiatic genera of Engystomidæ, are almost globular when distended with eggs. All the eight species of Discophidæ except one from British Burmah are natives of Madagascar.

About 250 species of Ranidæ are known, of which alone 110 belong to the genus *Rana.* Though the typical forms are aquatic, some species have digital dilatations, and some of these are arboreal. *Rana temporaria* is the most widely spread species, since it extends across the eastern continent from England to Japan, and across the western from California to the Atlantic. It varies widely, so that the diverging forms are sometimes considered species. One well-marked form is found in the Eastern States, another on the Pacific coast, while Europe and Asia have several. Four other species of Rana live in the Eastern United States. These are the leopard frog (*R. halecina*), which extends to Guatemala; the bull-frog (*R. catesbiana*), *R. clamata*, and *R. palustris.* The last but one of these is the common green frog of cold springs, and may be recognized by the enormous size of its ear-drum; *Rana palustris* is inaptly named, since it wanders farther from water and higher into the mountains than *R. halecina*. The species of Rana lay their eggs in more or less globular masses, not in strings like the toads.

In the dry regions of South Africa are several species of Rana which live in holes in the ground, issuing after rains. These have a sort of shovel on their hind-foot, like the Pelobatidæ.

Very few Ranidæ live either in South America or Australia, and the family has its head-quarters in the East Indies. Many of the forms are arboreal in habit. The genus *Rhacophorus* includes the largest and most brilliantly colored of tree-frogs, and comprises some Malaysian species in which the webs connecting the fingers and toes are so large that, like the lateral expansions of the flying-squirrel, they form parachute-like supports for the creature in its long leaps from tree to tree.

Frogs appear to be a desirable article of food, notwithstanding the English prejudice against them. Certain species are eaten in various parts of the civilized world. Thus *Rana esculenta*, the green or edible frog, is a favorite article of food in Central and Southern Europe, and *R. temporaria* is not eaten; while on the Pacific coast of the United States it is the large local variety of *R. temporaria* that is eaten, chiefly by French and Italians. The bull-frog is coming into favor as an article of food in the Eastern States.

(W. N. L.)

FRONTENAC, Louis de Buade, Count de (1621–1698), a French governor of Canada, was born in France in 1621. Entering the army as colonel in 1638 he served under Maurice of Nassau in Italy, Flanders, and Germany, and in 1669 was made a lieutenant-general. Louis XIV. appointed him governor-general of Canada, where he arrived in September, 1672. To repress the troublesome Iroquois he built Fort Frontenac (now Kingston). He took an active interest in the exploration of the Great West, sending Marquette and Joliet to the Mississippi, and furthering the projects of La Salle. His arbitrary conduct, however, excited the ill-will of Bishop Laval and other officials and caused his recall in 1682. His wife was a court beauty and used her influence to procure his reinstatement that she might be free from his presence. He was again commissioned in 1689, and soon stirred up fresh hostilities against the frontier settlements of New England and New York. He defeated the expedition of Sir William Phips for the capture of Quebec in 1690, and regained for the French their former control of the Indian tribes. Worn out with his labors Frontenac died at Quebec, Nov. 28, 1698. A century later his remains were transferred to the Cathedral of Quebec. His life forms the subject of Parkman's *History of the French Dominion in America.*

FROTHINGHAM, Nathaniel Langdon (1793–1870), an American Congregational minister, was born at Boston, July 23, 1793. He graduated at Harvard College in 1811, and afterwards taught there rhetoric and oratory. In 1815 he was ordained pastor of the First Congregational Church of Boston, and retained this charge till 1850. Besides numerous sermons he published *Metrical Pieces, Translated and Original* (1855). He died at Boston, April 4, 1870.

FROTHINGHAM, Octavius Brooks, an American clergyman and author, was born in Boston, Nov. 26, 1822. He was the son of the preceding, and on the maternal side a grandson of Peter C. Brooks. He graduated at Harvard College, 1843; became pastor of a Unitarian church at Salem, Mass., 1847; removed in 1855 to Jersey City, N. J., whence in 1857 he went to New York city. Here he became pastor of a congregation of Free Religionists, assuming a position confessedly outside the pale of Christianity. In 1882 he abandoned public speaking and retired to Boston, still continuing his literary activity. Besides many pamphlets and sermons he is author of *Stories from the Lips of the Teacher* (1863); *Stories of the Patriarchs* (1864); a translation of Renan's *Critical Essays* (1864); *Child's Book of Religion* (1866); *The Religion of Humanity* (1873); *Life of Theodore Parker* (1874); *The Safest Creed* (1874); *Beliefs of the Unbelievers* (1876); *History of Transcendentalism in New England* (1876); and a *Life of George Ripley* (1883).

FROTHINGHAM, Richard, an American historian, was born at Charlestown, Mass., Jan. 31, 1812. For several years he was connected with the *Boston Post*, and was active in politics as a Democrat. He was six times elected to the Massachusetts assembly and thrice mayor of Charlestown (1851–53). Besides a *History of Charlestown* (1848) and other local histories he published *Life of Gen. Joseph Warren* (1865) and *Rise of the Republic* (1872).

FROUDE, James Anthony, an English historian, was born April 23, 1818, at Totness, Devonshire, where his father was archdeacon. He studied at Oriel College, Oxford, graduating in 1840, and was afterwards chosen a fellow of Exeter College. He was then strongly influenced by the Tractarian movement and took deacon's orders in 1845. But he was soon repelled by the Romanizing tendency of his associates, and turned from theology to literature. He published *Shadows of the Clouds* (1847), a tale, and *Nemesis of Faith* (1849), both of which were condemned by the university. He then gave up his fellowship and devoted himself to writing for *Fraser's Magazine* and the *Westminster Review.* His great work, *The History of England from the Fall of Wolsey to the Defeat of the Spanish Armada*, began to appear in 1856, and was completed in twelve volumes in 1870. By close investigation and abundant use of the statute books and other documents of the time he endeavored to rehabilitate Henry VIII. as the champion of English independence, while he also transferred to Queen Elizabeth's ministers much of the credit which had been assigned to her by former historians. His work throughout is marked by an ultra-Protestant tone, which leads him to severe condemnation of Mary Queen of Scots. In 1869 he was made lord rector of the University of St. Andrews, where he delivered an address on *Calvinism* (1871). In 1872 he visited the United States and delivered a course of lectures on *The English in Ireland in the Eighteenth Century* (enlarged to 3 vols., 1873–74). In these he endeavored to justify the severe repressive measures of the English towards the Irish Roman Catholics on the ground of necessity. Several of Froude's contributions to the magazines were gathered under the title *Short Studies on Great Subjects* (1867), and he has also written biographical sketches of *Cæsar* (1882) and *Becket* (1883), brilliant in style but careless in the statement of fact. Froude was selected by Carlyle to be his literary executor, and in fulfilment of his trust has published *Carlyle's Reminiscences* (1882) and a *Life of Carlyle* (1884). The revelations made in these volumes of Carlyle's cynical judgment of his supposed friends and of his harsh treatment of his devoted wife provoked some censure of the biographer who gave publicity to the unpleasant facts. Yet in obedience to what he considered the interests of truth he persisted in the course which he had marked out.

FRUIT. Of the succulent fruits which constitute so large and important a portion of the food of man and the lower animals the variety is so great that we can here consider only the more important fruits of the temperate zone, with brief reference to the better known products of the torrid zone. Botanically every phanerogamous plant has its fruit, consisting of the seeds and seed-vessels with the other associated parts. But commercially this name is applied only to the succulent fruits, while the edible seeds are usually known as nuts and grains. The fruits of the great mass of plants do not come under either of these categories and have no commercial value. Of the fruits of the northern temperate zone those best known and most important are the apple, the pear, the peach, the apricot, the plum, the cherry, the quince, the fig, the melon, and the grape, with the several familiarly known berries, the strawberry, raspberry, blackberry, gooseberry, currant, whortleberry, cranberry, etc. To these may be added as fruits made very familiar in the North through commerce the orange, lemon, and lime, the banana, pineapple, and olive, most of the remaining fruits of the tropics being too perishable to bear transportation or not being sufficiently desirable to command a profitable sale.

The cultivation of most of these fruits has been extended very far beyond their native regions, and they are now raised wherever the climate and soil render this possible. In this outspreading the apple and pear take the lead, they being capable of cultivation through a very considerable range of climate, extending far into the cold regions of the north, while their geographical range extends around the whole circle of the north temperate zone. They have another quality which gives them great value: their varieties ripen from midsummer until late in the autumn. This quality is as yet shared by few fruits, though the seasonal range of the peach has been greatly increased by recent cultivation and selection.

The succulent fruits, which form so valuable a portion of the food of the human race, are, in their present state, largely a product of intelligent cultivation. In their wild state most of them are small in size and some of them unpleasant in taste, their present great size and luscious flavor being largely due to persistent selection of the best varieties. But this selection has been going on for ages, and, though it was of old mainly effected through hap-hazard choice, it had resulted in producing many improved varieties at the era of the early empires. At the opening of the fourth or fifth centuries of the Christian era we know that figs, peaches, apricots, oranges, citrons, apples, pears, cherries, plums, olives, quinces, grapes, and the principal berries and nuts were in successful cultivation, several varieties of most of them being known, chief among which were thirty-six varieties of the pear. Since that period the dissemination of the hardy fruits has been great, the whole civilized world being occupied. Yet the number of varieties did not greatly increase until after the opening of the present century, though during this century it has been enormously augmented. North America owes most of its cultivated fruits to the French settlers and the Romish missionaries, who were diligent in introducing European varieties. The English settlers also took some share in this work. Though indigenous species of cherries, plums, apples, etc., were found in this country, yet the orchards were early supplied with European varieties, and little effort has been made to develop the native fruits. The French settlers gave much attention to the apple and pear, these being introduced before 1640 and freely cultivated by 1650. The settlers of New England also had apples in bearing by 1639, and a nursery of imported apple-trees in 1640. The grape was introduced by Jesuit missionaries into California and elsewhere in the warmer regions of the country. But the European variety proved unsuitable to the colder climate of the North, and the native species of this fruit have been freely cultivated. The first record of commercial nurseries in America for the growth and sale of fruit-trees is about 1798. Many varieties were then known, especially of the apple, though but few as compared with those now cultivated. Early in the present century fruit-culture became an important agricultural interest, and has developed steadily until the present time. Of the varieties now known the United States enumerates nearly 2400 distinct kinds of apples and about 1300 pears, while peaches, grapes, and strawberries number each over 500. The total number of varieties of apples and pears in existence throughout the civilized world cannot be definitely stated, but has been enormously augmented by the careful and skilful operations of modern fruit-raisers.

The production of new varieties of fruits is now one of the most important of agricultural operations, and very great skill has been attained in its operation. This result is produced by sowing the seeds of carefully selected fruits, while the preservation of any valuable variety is attained by grafting and related processes, it never being sure that a seed will yield a copy of the parent variety. In addition to selecting the seeds of the best and hardiest varieties, the crossing of varieties is also carefully practised, both by growing unlike trees in propinquity in order that natural crossing may take place and by artificially impregnating the stigma of the flower of one tree with pollen taken from another. Probably the best results have arisen from natural impregnation. Of the names specially connected with this art the most prominent are those of Van Mons of Belgium and Knight of England. Van Mons for years constantly selected the best seeds of the pear, beginning with the wild fruit and continuing to select through eight generations, by which time he had produced a great deviation from the original. He had exceptional advantages, having in the early part of his experiments an orchard of as many as 80,000 trees to select from. He thus produced numerous useful varieties. In Knight's operations artificial crossing of varieties was very successfully practised. It is to these various processes that we owe the numerous and highly valuable varieties of the cultivated fruits now in the market. To this, however, must be added the preservation of what are known as *sports*, apparently chance variations, such as that which yielded the nectarine from the peach.

The soil and climate of America are very well adapted to fruit-culture, and it has not been extended as much as is desirable, nor has its practice been generally conducted with that skill that is essential to profitable agriculture. Good soil is needed for fruit-trees as well as for any other vegetable product, and the poor bearing and poor fruit, which many farmers are inclined to charge upon their trees, are really due to themselves. They starve their trees and expect a generous return. Fertilization is necessary for the best results, though it must be conducted wisely. The peach, apricot, and nectarine, for instance, will not bear too high fertilization, since it stimulates them to grow too late in the season and exposes them to damage by frost. Another requisite to the best results is the thinning of fruit in prolific seasons. This is very greatly neglected, yet if the tree be crowded the fruit will be small and deficient in flavor. Where practised it proves very efficacious, the fruit being made finer in quality while the total bulk is not usually reduced. It also permits the removal of the insect-stung or otherwise defective fruit, which, if left on the tree, robs the more perfect fruit of nutriment, while itself of little value. A third necessity is an incessant fight with the insect enemies by which many fruit-trees are attacked and with the diseases to which they are subject. All this entails much labor, but it is not unprofitable labor. The apple, the most easily managed of fruit-trees, yields under ordinary methods of cultivation a product worth from $50 to $100 per acre, yet with skilful culture may be made to yield $200 or $300. With pears, grapes, and strawberries more labor and skill are required, but the results are in accordance. Grapes may be made to yield from $300 to over $500 per acre; pears $500, and sometimes much more; while strawberries, which ordinarily yield $200 to $300, may with exceptional care and skill be pushed well up towards $1000 per acre.

Our ordinary fruits may be divided into the several classes of seed fruits, stone fruits, and berries. The second of these, comprising the plums, peaches, cherries, etc., are distinguished by possessing a single seed, of great size, and protected by a hard covering. They are marked off from the nuts by the fact that their seed is usually of unpleasant flavor, and is enclosed in a soft and juicy outer covering of highly agreeable taste. The seed fruits, the apples, pears, etc., differ from the above by the possession, in a central case, of several small seeds instead of one large one; while in the berries the seeds are disseminated throughout the flesh—a berry constituting usually an aggregation of many small fruits into one large one. Yet the variations of plants in this respect are so great that no strict classification can be made. In such fruits as the melons, for instance, or in the banana, the seeds are arranged in a manner that comes under none of the above categories.

Of the several fruits the apple has long held its own as the favorite fruit of temperate climates. Though less delicious than the pear or peach, its greater hardiness, ease of culture, and long-continued bearing power of the tree, have kept for it a steady reputation. It has also the advantage that it can be kept longer with less care than other fruits, and this forms a valuable addition to the food-supply of winter. With most other fruits preservation in a fresh state is difficult to perform, and is impossible with the more juicy species, with the exception of the grape. The apple and the pear continue to ripen after pulling. This is a notable characteristic of the pear, most varieties of which ripen with a finer flavor if plucked and ripened in the house. This is not the case to any marked extent with most of the fruits, though it is a useful property in several of the imported fruits, such as the orange, banana, and pineapple, which can be plucked unripe, and will ripen on the voyage.

It is not necessary here to enter into any description of the characteristics of our several fruits, either as to their form, flavor, or general character. It may simply be said that they not only vary greatly in size, shape, color, and general appearance, but also in degree of juiciness and of sweetness or acidity, while in certain instances bitterness, astringency, pungency, or some other unpleasant quality, detract from their value. The aroma also varies from pleasant to unpleasant, while nearly every fruit has some characteristic flavor which renders it easily distinguishable, and which may differ in degree of agreeableness. There is thus a great diversity in the characteristics of fruits as articles of diet, and an adaptation to every variety of human taste. As to degree of consistency we may pass from the firm flesh of the apple, through the successively more juicy textures of the pear and peach, to such fruits as the plum, the cherry, the orange, and the melon, with their abundance of juice. As to flavor of this juice the strawberry, cherry, and plum present marked grades of variation from sweetness to tartness, a variation which is strongly marked in the closely related orange and lemon. Many of these fruit acids are of the highest value in the preservation of health; this being particularly the case with the juice of the lemon and lime, while the growing popularity of the cranberry is doubtless due to the same causes. As a rule, indeed, the fruits of summer and autumn form a store of food specially adapted to those seasons, and the health of every community would undoubtedly be bettered by a free consumption of fruits in their proper season.

Within recent years the availability of the fruit supply has been greatly enhanced through several causes. One of these we have already adverted to, the production of earlier and later varieties, so as to extend the duration of the fruit season. This has been most efficient with the apple and pear, though it has been very effective also with the peach. With most other fruits there has been but little extension of the season of bearing. Yet in numerous cases commerce has overcome this difficulty, and the season of certain perishable fruits, such as the strawberry, for instance, has been extended by transport, beginning with the crop of the far South and ending with that of the far North. Commerce in fruits, indeed, has been so greatly developed that now the favorite tropical fruits, formerly scarce and dear in Northern markets, fairly compete with the product of our own trees in cheapness and abundance, and the orange, banana, pineapple, etc., are almost as familiar in our markets as the apple and pear. The ability of transporting the more perishable fruits has been greatly augmented by the use of rapid conveyances and of refrigerating apparatus in cars and vessels, so that the fruits of California are now transported in abundance to the Atlantic States, while the peaches of New Jersey and Delaware, once confined to their immediate neighborhood, are now spread far through the North and West. But we are by no means confined to the consumption of fruits in their seasons, or the preservation of a few species in a fresh state beyond their seasons. The methods of preserving fruits for winter use have greatly extended and improved of late years and to these methods some attention is here demanded.

Fruit Preserving.—The old methods of preserving fruit, beyond that of keeping it in a fresh state, were two, drying by solar heat, and preservation by the curative properties of acids, alcohol, saltpetre, salt, sugar, etc. These gave rise to the pickles, the brandied fruits, the marmalades, the candied and sugar-preserved fruits of old housekeepers, processes which are still largely practised, though not so extensively now as formerly. The drying, as then practised, was a very crude and unsatisfactory process, the sliced fruit, often poorly selected and prepared, being exposed not only to the sun and wind, but to dust and insects, and yielding a hard and blackened product that needed faith and good teeth in its mastication. With care and skill sun-dried fruit was rendered more palatable, yet the process was never a very effectual one as applied to our apples, peaches, etc. With fruits dried whole, such as grapes and plums, it yields better results, and currants, raisins, and prunes are thus produced, though oven-drying is partly employed. The cheapness of the drying process of preservation has brought it into more vogue of late years, and solar heat has been replaced by more rapid artificial agents. The effect of sun-drying is seldom rapid enough to prevent discoloration and some degree of decay, and artificial heat, in closed receptacles, has taken its place. The oven-drying, as at first practised, was ineffective from lack of circulation of the air, the warm, damp air rather cooking than drying the fruit. This was succeeded by placing the cut fruit on trays in a chamber so constructed that a draught of hot air could be sent from the stove up through the chamber. This proved effective if care was taken to change the trays of fruit so that they should dry equally. In the important Alden evaporating process all this is done mechanically, and the temperature and degree of moisture nicely graduated to produce the best results. This apparatus consists of an evaporating chamber, of some 5 feet square by 20 feet high, provided with an endless chain, by whose movement the trays of fruit, which are introduced at the top, sink slowly downwards, and are taken out fully dried at the bottom. There are a steam-coil and a blower below, the current of air from the blower being heated to the desired temperature by the coil, this being generally from 160° to 195° Fahr. The blast is never quite dry, some degree of moisture being considered necessary to prevent too rapid drying. This air enters the chamber at the bottom at maximum heat and dryness, and escapes at the top reduced in temperature and loaded with the moisture which it has extracted from the fruit. Thus the trays of fruit when first introduced meet a moist, warm air, which extracts some moisture, but not with sufficient rapidity to harden or discolor the surface. As the trays descend they meet the air in a warmer and drier state, while they yield their reduced moisture at about the same rate. Reaching the bottom their small remnant of water is extracted by the hot and dry air at this point, and the fruit issues with unchanged color and no induration of the surface. This process has been applied to a great variety of fruits and vegetables, and yields a product which, when again soaked in water, is hardly distinguishable from the original fruit.

Yet the most recent suggestion in relation to fruit drying is that heat is unnecessary and injurious as a curative agent, causing a partial destruction of flavor and some degree of fermentative change in the fruit. This has led to the cold-blast system, in which the fruit is exposed to a current of dry air at a low temperature. The air employed is deprived of its moisture by chemical agents, and kept at a temperature of from 32° to 60° Fahr. The process otherwise resembles the above, but it has a great advantage in economy over the hot-air process, while the dried fruit is said to retain its flavor, color, and other virtues in almost perfection, and to remain good for an indefinite period.

Another and highly valuable preservative process, which has grown to enormous proportions in recent years, is that of canning or preservation in air-tight tin cans or glass jars. This process, applied to every description of perishable food, requires that sufficient heat should be used to destroy all germinal particles capable of setting up fermentation or putrefaction, which the air or the fruit may contain. Being made air-tight while thus heated the causes of decay are effectually removed, and the food may be kept intact for an indefinite period. It is, of course, partly cooked by the heat applied, yet its natural qualities are very well retained, and if cooked on removal from the can it can scarcely be distinguished from fresh viands when cooked. In preserving fruit by this process sugar is generally added, but no more than is necessary to impart an agreeable flavor.

The preservation of fruits and other materials by this method has extended until it is now an industry of great importance, and, as a means of providing vessels with preserved food or of sending the fruits of any country to foreign regions, it is far in advance of any other process employed. We have no statistics as to the value of fruits alone thus preserved, but the canned and preserved fruits and vegetables prepared for sale in the United States in 1880 were valued at $17,599,576. These were in addition to the very great quantities similarly preserved for home use, which, if added, would greatly swell this sum.

In 1870 the value of orchard products in the United States was, reduced from gold rates to ordinary rates, about $38,000,000. In 1880 it amounted to $50,876,154, showing a very marked increase. Of this sum New York is credited with $8,409,794, Pennsylvania with $4,862,826, Ohio with $3,576,242, Illinois with $3,502,583, and Indiana, Michigan, and California with over $2,000,000 each. In some States, particularly in the South, the increase from 1870 to 1880 was in a great percentage, as also in some of the rapidly settling States of the extreme West. (C. M.)

FUEL. The substances employed in America for fuel are mineral coals (anthracite, bituminous, and lignite), coke, wood, charcoal, mineral oils, gas, both natural and manufactured, and to a limited extent peat and residuary products from the distillation of coal, wood, or oils. Indicating the dependence upon mineral fuel is the fact that the mining of coal is the most extensive single industry in the United States.

See Vol. IX. p. 709 Am. ed. (p. 807 Edin. ed.).

The relative consumption of the mineral fuels may be judged from the following statistics. In 1884 there were mined 33,175,756 gross tons of anthracite coal, and 73,730,530 gross tons of bituminous coal, lignite, etc. About ten per cent. of the bituminous coal was made into 4,350,000 gross tons of coke, and a considerable amount is also converted into a gaseous form in producers for consumption in furnaces used in manufacturing industries. Another considerable quantity of bituminous coal is made into illuminating gas, the resultant coke and some of the gas being used as fuel.

For domestic purposes wood and anthracite or bituminous coal are chiefly depended upon, some charcoal, particularly for cooking, is used, and gas is growing in favor for both heating and cooking in the cities. For steam-generation local considerations affect the choice of fuel, and anthracite coal, bituminous coal, and wood are largely used. In manufacturing, all kinds of fuels are utilized. Where a flame is required, bituminous coal, gas made from it, natural gas, or wood are preferred. Where flame is not an object, anthracite coal, coke made from bituminous coal, or charcoal are preferred. In the manufacture of iron, statistics prepared by the American Iron and Steel Association show that in 1884 the consumption of fuel was as follows:

	Gross Tons.
Anthracite coal	1,973,305
Bituminous coal	4,226,986
Coke from bituminous coal	3,833,170
Charcoal (62,110,660 bushels, equivalent to)	517,600
Wood not accounted for.	

In 1884 the estimated consumption of natural gas for fuel purposes was equivalent to the heating capacity of nearly 2,000,000 gross tons of mineral fuel. In cities the residual coke from the manufacture of illuminating gas is purchased for minor industrial purposes.

Artificial fuels are simply fine particles of coal cemented together by clays, by tarry matter, or by heat and pressure. The fine anthracite coal is generally called culm; fine bituminous coal, slack, vreeze, or braize.

The census statistics for 1880 show that 32,375,074 persons used wood for domestic purposes, consuming 140,537,439 cords, and that the total consumption was in that year 145,778,137 cords of wood; probably 7,500,000 cords more were cut and made into charcoal. It is estimated that the annual fuel consumption of the United States is equivalent to from 3 to 4 gross tons of coal per inhabitant, *i. e.*, reducing wood and other fuels to approximate calorific value of coal. The U. S.

Table of Fuel Values.

Common name.	Region.	Fuel Value.		Order by weight.	Percentage in Dry Woods.						Specific gravity.	Weight of a cubic foot in pounds.
		By volume—per cubic decimeter.	By weight—per kilogram.		Ash.	Hydrogen.	Carbon.	Oxygen.	Hydrogen combined with oxygen.	Excess of hydrogen.		
Mountain Mahogany	Interior Pacific .	4,234.06	4,052.90	34	1.20	5.45	52.14	41.21	5.15	0.30	1.0447	65.10
Long-Leaved Pine .	S. Atlantic Coast	4,113.33	5,545.82	1	0.26	7.41	58.61	33.72	4.21	3.39	0.7417	46.22
Shellbark Hickory	Atlantic . .	3,851.17	4,078.76	28	0.73	6.49	49.67	43.12	5.39	1.10	0.9442	58.84
Chestnut Oak . .	Atlantic . .	3,843.69	3,997.32	38	0.34	6.33	49.59	43.74	5.47	0.86	0.7114	44.32
Pitch Pine . . .	Atlantic Coast .	3,472.26	5,491.47	2	1.12	7.19	59.00	32.68	4.07	3.11	0.6323	39.40
Pignut Hickory .	Atlantic . .	3,392.12	3,922.89	43	0.74	6.23	48.98	44 00	5.50	0.73	0.8647	53.88
White Hickory . .	Atlantic . . .	3,380.57	3,904.11	45	1.04	5.93	49.69	43.35	5.42	0.51	0.8659	53.96
Pitch Pine . .	S. Atlantic Coast	3,363.40	4,418.55	8	0.16	6.22	53.33	40.29	5.04	1.19	0.7612	47.44
Mesquit	Texas to Cal. .	3,291.21	4,352.30	11	2.05	6.61	51.08	40.26	5.03	1.58	0.7562	47.12
Overcup Oak . . .	S. Atlantic . .	3,268.92	4,105.65	25	0.58	6.75	49.22	43.45	5.43	1.32	0.7962	49.61
White Elm . . .	Atlantic .	3,247.02	4,191.87	19	0.74	6.57	50.35	42.34	5.29	1.28	0.7746	48.27
White Oak . .	Atlantic .	3,197.41	4,187.83	21	0.24	6.59	50.44	42.73	5.34	1.25	0.7635	46.58
Spanish Oak . .	S. Atlantic .	3,193.28	4,055.48	33	0.29	6.14	50.58	42.99	5.37	0.77	0.7874	49.07
Cedar	Pacific	3,143.57	4,587.81	6	0.88	6.03	54.97	38.12	4.76	1.27	0.6852	42.70
Bitter Pecan . . .	S. Atlantic .	3,140.33	4,073.59	30	1.90	6.60	49.16	43.05	5.38	1.22	0.7709	48.04
Yellow Pine . . .	S. Atlantic .	3,091.82	5,062.75	3	0.20	6.91	56.64	36.25	4.53	2.38	0.6107	38.06
Sugar Maple . . .	Atlantic . . .	3,091.37	4,345.48	12	0.56	6.61	51.55	41.28	5.16	1.45	0.7114	44.32
Red Oak .	Atlantic . .	3,062.08	4,075.16	29	0.15	6.62	49.49	43.74	5.47	1.15	0.7514	46.72
Persimmon	Atlantic .	2,970.45	3,781.61	50	0.77	6.44	47.37	45.42	5.67	0.77	0.7855	48.95
Larch or Tamarack .	N. Atlantic . .	2,937.46	4,182.04	22	0.27	6.03	51.91	41.79	5.22	0.81	0.7024	43.77
Butternut Hickory .	Atlantic . . .	2,863.42	3,903.25	46	1.03	6.91	49.71	43.29	5.41	0.50	0.7336	45.71
Locust	Allegheny Mts. .	2,822.99	3,890.02	48	0.23	6.17	49.19	44.41	5.55	0.62	0.7257	45.22
Beech	Atlantic . . .	2,795.34	3,895.04	47	0.54	6.11	49.27	44.08	5.51	0.61	0.7175	44.71
Pecan	S. Atlantic .	2,768.72	3,954.75	41	0.95	6.15	49.51	43.39	5.42	0.73	0.7001	43.63
Black-Jack	S. Atlantic	2,692.51	3,713.81	54	1.37	5.73	48.58	44.32	5.54	0.19	0.7250	45.18
Water Oak . . .	S. Atlantic .	2,655.82	3,718.07	53	0.83	5.75	48.73	44.69	5.58	0.17	0.7143	44.51
White Ash	Atlantic . .	2,652.34	4,217.42	17	0.30	6.93	49.73	43.04	5.38	1.55	0.6289	39.19
Black Oak	Atlantic . . .	2,595.04	3,774.60	51	0.15	6.09	48.78	44.98	5.62	0.37	0.6875	43.84
White Oak . . .	N. Pacific Coast .	2,594 31	3,667.39	55	0.33	5.73	48.56	45.38	5.67	0.06	0.7074	44.08
Canoe Birch . . .	N. Atlantic .	2,582 66	4,101.41	26	0.23	7.12	48.28	44.37	5.55	1.58	0.6297	39.24
White or Gray Birch	N. Atlantic Coast	2,509.00	4,073.05	31	0.29	6.49	49.77	43.45	5.43	1.06	0.6160	38.05
Yellow Pine . . .	Pacific	2,441.24	4,600.04	5	0.31	7.02	52.60	40.77	5.10	2.00	0.5307	33.07
Sycamore	Atlantic . . .	2,406.89	4,071.83	32	0.57	5.83	51.45	42.15	5.27	0.57	0.5911	36.83
Nut Pine . . .	Interior Pacific .	2,270.77	4,149.04	23	0.83	6.39	50.48	43.30	5.41	1.10	0.5473	34.11
Sweet or Red Gum	Atlantic .	2,255.24	4,016.46	37	0.48	5.85	50.99	42.68	5.33	0.52	0.5615	34.99
Scrub or Gray Pine .	N. Atlantic . .	2,152.66	4,393.18	9	0.19	6.29	52.93	40.59	5.07	1.22	0.4900	30.54
Black Pine	Allegheny Mts. .	2,054.73	3,995.30	39	0.30	5.78	51.07	42.85	5.35	0.43	0.5143	32.05
Red or Norway Pine	N. Atlantic .	2,051.75	4,226.05	16	0.20	6.07	52.18	41.55	5.19	0.88	0.4855	30.26
Loblolly Pine . . .	S. Atlantic .	2,031.75	4,087.20	27	0.25	6.23	50.60	42.92	5.36	0.85	0.4971	30.98
Jersey or Scrub Pine	Atlantic . . .	2,008.20	4,126.15	24	0.26	6.30	50.74	42.70	5.34	0.96	0.4867	30.33
Redwood	California Coast .	1,985.50	4,191.47	20	0.13	6.01	52.10	41.70	5.21	0.79	0.4737	29.52
Black Walnut . . .	Atlantic .	1,984.56	3,857.26	49	0.56	6.00	49.28	44.16	5.52	0.48	0.5145	32.06
Cypress	S. Atlantic . .	1,921.63	4,705.27	4	0.40	6.54	54.98	38.08	4.76	1 68	0.4084	24.45
Cottonwood . . .	Atlantic .	1,906.42	4,242.15	15	0.65	6.26	51.64	41.45	5.18	1.08	0.4494	28.00
Chestnut	Atlantic . . .	1,868.25	4,042.96	35	0.13	5.70	51.74	42.43	5.30	0.40	0.4621	28.80
Digger or Bull Pine .	California . . .	1,804.29	3,982.97	40	0.42	6.04	50.22	43.32	5.41	0.63	0.4530	28.28
Tamarack	Pacific . . .	1,791.33	4,019.13	36	0.37	6.22	50.05	43.36	5.42	0.80	0.4457	27.78
Sugar Pine	California . . .	1,785.49	4,419.31	7	0.19	6.40	52.85	40.56	5.07	1.33	0.4040	25.18
Red or Yellow Fir .	Pacific . . .	1,766.32	4,354.84	10	0.03	6.42	52.32	41.23	5.15	1.27	0.4056	25.28
Hemlock	N. Atlantic . .	1,724.26	4,208.58	18	0.48	5.91	52.38	41.23	5.15	0.76	0.4097	25.53
Aspen	Atlantic & Pacific	1,624.64	4,292.31	13	0.74	6.58	51.13	41.55	5.19	1.39	0.3785	23.59
Black Spruce . .	N. Atlantic . .	1,614.11	3,949.37	42	0.30	6.58	48.45	44.67	5.58	1.00	0.4087	25.47
White Pine . . .	N. Atlantic . .	1,489.03	4,272.69	14	0.12	6.08	52.55	41.25	5.15	0.93	0.3485	21.72
Yellow Poplar . . .	Atlantic . . .	1,425.57	3,744.61	52	0.27	6.43	47.29	46.01	5.75	0.68	0.3807	23.72
Yellow or White Cedar	N. Atlantic . .	1,411.57	3,917.77	44	0.37	6.37	48.80	44.46	5.56	0.82	0 3603	22.45

See also Marcus Bull's Tables and Chevandier's analysis in the article on CHARCOAL.

Census of 1880, Vol. IX., page 489, illustrated by a colored map the predominant character of fuel used in various sections of the United States. The accompanying table of fuel values was prepared by Prof. C. S. Sargent, special agent of the census.

The moisture was determined by drying the wood at 100° C., until its weight becomes sensibly constant, when the calculations were made on the dry wood. The results contain a slight constant error, rarely amounting to one per cent., arising from the fact that the nitrogen in the wood was not determined. The column headed "Hydrogen combined with oxygen" is found by dividing the amount in the column headed "Oxygen" by eight, and represents the hydrogen that may be considered as already combined with oxygen in the form of water, and is therefore useless for fuel.

The woods are arranged in the order of relative value by equal volumes; the figures in the column "Order by weight" show the order of relative value by equal weights.

It is to be regretted that in this table the percentages of water driven off when being dried were not noted, for, as ordinarily obtained, the hygroscopic water in various woods would affect their relative fuel values even more than the theoretical values as given in the table. Experiments by Shindler show that the percentage of water in winter, when the tree was dormant, and in the spring when sap was flowing, was:—Ash, 28.8 and 38.6; sycamore, 33.6 and 40.3; white fir, 52.7 and 61.0. Even after six months' air-drying felled timber frequently contains from 20 to 40 per cent. of hygrometric water.

See CHARCOAL, COAL, COKE, GAS, etc. (J. B).

FUGITIVE SLAVE LAWS. The Constitution of the United States contains the following provision: "No person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due." Article IV., § 2, ¶ 2.

It is worthy of notice that the word *slave* does not occur either here or in any other part of the Constitution. The terms used apply as properly to indentured apprentices as to slaves. In Northern newspapers, down to 1840 and later, might be seen advertisements of runaway apprentices as conspicuously if not as often as notices of runaway slaves appeared in the Southern newspapers. That slaves were had in view in the framing of the article we know, but care was taken not to avow it. Equally noticeable is the absence of any terms even remotely suggesting the idea that the fugitive might be regarded as property. On the contrary, he is described as a *person* from whom service or labor is *due*.

If a person of good understanding, but without technical knowledge of law, were to read this paragraph of the Constitution, it would hardly occur to him that the words convey any power or impose any duty on Congress. That body is not named nor referred to. The terms used seem to imply only State action, and to define the duty that one State owes to another. Congress, however, at a very early period, assumed jurisdiction over the subject. The first fugitive act, passed in 1793, declared that whenever a person held to service, etc., shall escape into another State or Territory, the person to whom such service may be due, his agent or attorney, may seize or arrest such fugitive and take him before any judge of a court of the United States, or any magistrate of a county, city, or town, and upon proof to the satisfaction of the judge or magistrate, whether by oral testimony or sworn affidavit, that service is owed as claimed, the judge or magistrate shall give a certificate thereof to the claimant, which shall be sufficient warrant to remove the fugitive. This act, it is plain, was framed in the sole interest of masters. It provided no safeguard for the rights of the person claimed as a slave. The Constitution guarantees Amendment V.) that "no person shall be deprived of life, *liberty*, or property without due process of law," *i. e.*, of course, common law; and that (Amendment VI.) in suits at common law, where the matter in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved. But when a man's personal liberty is at stake, no jury-trial is provided. And as jurisdiction was given not only to courts but to petty magistrates, many of whom were ignorant and some corrupt, and the certificate of a Justice Shallow was as conclusive as that of a Justice Story, it was almost inevitable that under cover of this loosely drawn statute free colored people would be kidnapped. There were many complaints of such outrages, especially in Pennsylvania and other border States. Some of the States passed laws in restraint of such abuses. Massachusetts enacted a law to secure trial by jury in all cases in which the right of personal liberty was in question. Pennsylvania passed a law against kidnapping. It was a case arising under that statute which, carried to the Supreme Court of the United States, led to a decision that had important consequences—the case entitled *Prigg* vs. *Pennsylvania*. The opinion of a majority of the court, as given by Justice Story, disregarding the cautious reserve of the Constitution, speaks articulately of "slaves," alludes to them as the "property" of their masters, and alleges that the clause of the Constitution on this subject was intended to secure owners of slaves in the possession of their property. It was held that the owner of a slave was clothed with entire authority in every State in the Union to seize and recapture his slave whenever he could do it without a breach of the peace or illegal violence. No legal process was necessary, but the constitutional provision was to that extent self-executing; that the act of 1793 was constitutional, and superceded all State legislation upon the same subject; that the Constitution lays on the States no obligation to provide remedies, and confers on them no power to legislate on the subject. Two of the judges dissented from the doctrine that a claimant could seize his "property" without legal process, and two from the denial of the right and duty of the States in the premises.

It would be out of place here to discuss the merits of this decision. Its effect was soon seen. The States willingly complied with the mandate to keep their hands off this business. Some forbade their courts to hear such claims, forbidding also under severe penalties their officers to arrest and their gaolers to detain alleged fugitives from slavery. An increasing number were equally unofficious, preferring, indeed, to help the fugitive onward in the direction of the North Star, by "the underground railroad." (See ABOLITIONISTS.) These developments caused no small irritation among slaveholders, which led, in connection with other matters of sectional agitation, to the enactment of the Fugitive Slave Act of 1850.

This statute, to fill the vacuum made by the withdrawal of State agencies, conferred on commissioners appointed by the United States courts the powers given to judges and magistrates. Additional commissioners were to be from time to time appointed. Commissioners were given concurrent jurisdiction with judges. Marshals and deputy-marshals were required to obey and execute warrants and other processes, under penalty of one thousand dollars for refusing or neglecting; and, if a fugitive should escape after arrest, the marshal or deputy was subject to be prosecuted on his official bond for the full value of the service or labor claimed to be due—in plain English, for his value as a slave. Commissioners were empowered to appoint other persons to make arrests, having power also to summon bystanders to help. Fugitives arrested under or without warrant were to be taken forthwith before a judge or commissioner, who should hear and determine the case by summary process. It was provided that an affidavit alleging service due, and an escape, with a description of the person, might be sworn to, and certified by any magistrate under seal, and such seal should be sufficient to establish the competency of the proof. Provision was made for military aid to the marshal if needed, and such extraordinary expenses were made a charge upon the public treasury. As a fitting climax to the whole, the commissioner was to be paid a larger fee for a certificate of extradition than for a discharge.

The act, it will have been observed, made the sworn statement of the claimant or his agent conclusive proof. The commissioner was not to inquire whether "labor or service was due." It was enough that the claimant said under oath that it was due. The claimant was his own judge and jury; the commissioner and marshal were his ministerial officers to do his bidding. A curious commentary on the law was made by the first case of its enforcement. The alleged fugitive was surrendered to the agent of the alleged owner. But when he reached his destination in Virginia the claimant discovered that it was a case of mistaken identity, and the man was returned to his Northern home, happy in having to do with a man of justice and honor. To how many would the bait to their cupidity have been a temptation too great to be resisted, especially considering that the kidnapping would have been entirely according to law! In a case that occurred in Boston the alleged fugitive offered to prove his freedom, but the commissioner decided that the evidence could not be admitted. He could only inquire whether the person before him was the person described in the affidavit. That being found, extradition was decreed as of course.

It could not be deemed strange that such a law, enforced with such contempt of all the rules of common justice and of the feelings of humanity, created intense excitement. If more stirring events had not caused a more intense commotion, it may be doubted whether its enforcement would have often called attention to its peculiar features. It was as much the point of honor as the pecuniary grievance that moved men to action. It was observed that the slaveholders of the Gulf States, who very seldom suffered loss from the flight of their "property," were more excited on the subject than they of the border States, who bore the chief brunt of that misfortune. The Fugitive Slave Act bore its part in the prelude of the civil war, and passed away with the system of bondage from which it sprung.

References: *U. S. Statutes at Large*, 1793, 1850; Prigg *vs.* Pennsylvania, 16 *Peters' Reports*, 539; Sumner's *Speech on the Fugitive Slave Bill;* Wilson's *History of the Rise and Fall of the Slave Power.* (L. E. S.)

FULLER, MARGARET. See OSSOLI.

FULLER, RICHARD (1804–1876), an American clergyman, was born at Beaufort, S. C., April 22, 1804. He graduated at Harvard College in 1824, studied law, and, being admitted to the bar, began practice in his native town. In 1832 he was ordained, and became pastor of the Baptist church in Beaufort. He preached also in many parts of South Carolina and Georgia. His eloquence gave him a prominent place in his denomination, and in 1847 he became pastor of a church in Baltimore. Here he labored until his death, Oct. 20, 1876. He published *Letters on the Roman Chancery* (1840), addressed to Bishop England; and *Correspondence on Domestic Slavery* (1845), a controversy with Rev. Dr. Wayland. He also published several sermons, and assisted in editing the *Religious Herald.*

FULTON, JOHN, an American Episcopal clergyman, was born at Glasgow, Scotland, April 2, 1834. He was educated at Aberdeen, and came to the United States in 1853. He was ordained deacon in 1857, and priest in 1858, and became assistant to Bishop L. Polk in Trinity Church, New Orleans. He was banished from that city by Gen. B. F. Butler in 1862, for disobeying orders with reference to church services. After the war he became rector of St. George's Church, St. Louis, Mo. He has frequently been a delegate to the General Convention of the P. E. Church, serving on the committee on canons. In 1868 he received the degree of D. D. from the University of Georgia; and in 1881 that of LL. D. from the University of Alabama. He has published *Letters on Christian Unity* (1868); *Index Canonum* (1873); *Laws of Marriage* (1883); and has in preparation a *Documentary History of the P. E. Church in the Confederate States.*

FUMIGATION (Lat. *fumus*, smoke) is the process by which smoke, or certain gases, are produced and applied, (1) for the destruction of offensive odors; (2) for the extermination of vermin; (3) for the testing of drains or sewers for defects; (4) for the disinfection of ships, rooms, or clothing suspected of being infected with contagious or infectious disease.

(1.) To remove offensive odors, papers or rags may be burned, or pastilles made of charcoal and aromatic barks or spices. This has as a result simply to substitute a pleasant for a disagreeable odor, and has no disinfecting power whatsoever.

(2.) To destroy insects which attack and injure plant-life tobacco-smoke is frequently employed. For the extermination of vermin that infest beds, and out-of-the-way places, the fumes of burning sulphur are best adapted.

(3.) In testing house-drains to discover if any defects exist, the smoke from tarred- or sulphur-paper may be employed. One of the best contrivances for this purpose is the "asphyxiator," which has for a considerable time been in use in Great Britain, and has lately been introduced into the United States. It has enabled health-officers to detect leaks in drains and sewer-pipes, when all other means had failed. It consists of a combustion-chamber in which the prepared paper is ignited, and from which, by the rotation of a fan, the resulting smoke is forced into the pipes to be tested. If defects exist by which sewer-air could escape, they will be discovered by the emitted smoke.

(4.) For the destruction of infectious material, which is the only true disinfection, by fumigation, several substances may be employed. Among these the most important are (a) bromine, (b) iodine, (c) chlorine, and (d) sulphur. (a) *Bromine.* A solution of bromine in bromide of potassium exposed in saucers gives off vapors which are disinfectant in the proportion of 1 part to 500, provided that the air be moist and the exposure to the action of the vapors be continued not less than three hours. This method was employed during the war of the rebellion, but as bromine is a substance which cannot be safely nor easily manipulated, and as its disinfecting power is no greater than that of other substances which are without these disadvantages, it will rarely, if ever, be employed. (b) *Iodine.* The vapor of iodine may be produced by placing it upon a heated plate. It is a true disinfectant in the strength of 1 to 500, and an exposure of two hours. It condenses easily and is not readily diffused, for which reasons it is not well adapted for the disinfection of infected premises. (c) *Chlorine.* This gas may be produced by either of the following methods: First, to 4 parts of common salt and 1 part of binoxide of manganese add 2 parts, by weight, of water, and the same amount of sulphuric acid; second, to 1 part of powdered binoxide of manganese add 4 parts, by weight, of strong hydrochloric acid; third, to 3 parts of chloride of lime (bleaching powder, calx chlorinata) add 1 part of strong sulphuric acid. Chlorine decomposes sulphuretted hydrogen and ammonium sulphide, and destroys all organic matter with which it comes in contact. It is an efficient disinfectant in the proportion of 1 to 100, when the air and the articles to be disinfected are moist, and the exposure lasts one hour. The vigorous bleaching power, however, of chlorine makes its use for the disinfection of colored fabrics impracticable. It has been extensively employed in the disinfection of ships, but its intensely irritating quality, together with its bleaching power, has prevented its general use in household disinfection. (d) *Sulphur.* When sulphur is burned in the presence of an abundance of air, fumes are given off consisting of sulphurous oxide or anhydride (SO_2), also known as sulphurous acid gas. The advantages which this substance possesses are so many that, in fumigation as practised for the destruction of infection, it has almost entirely supplanted all other gaseous disinfectants. Sulphur melts at 111.5° C. (232.7° Fahr.), and takes fire at 260° C. (482° Fahr.), burning with a purplish-blue flame and forming SO_2. In experiments which have been made to test its action upon various fabrics it has been found that in exceptional cases only are the colors faded. So seldom, indeed, does this happen as practically to make it of no moment; fabrics colored with induline seem to be the most altered. Life, whether animal or vegetable, is destroyed by this gas; flies, when confined in traps in closed rooms, being killed in twenty-two minutes, while when at liberty to seek the least exposed places life may be prolonged for one hour and forty-five minutes. Ants and Croton bugs (*Ectobia Germanica*) are killed in about the same time. The temperature of the air of the room is raised 25° or 50° Fahr., according to the amount of sulphur burned. Theoretically, in order to completely burn out all the oxygen of 1000 cubic feet of air, there would be required 15.577 lbs. of sulphur. Experimentally, however, one observer was able to burn only 4.2 lbs., while another succeeded in entirely consuming 18.7 lbs. per 1000 cubic feet. In the latter case the room in which the experiment was conducted could not have been tightly closed. In the process of combustion of sulphur, the SO_2 formed takes up moisture from the air, and a portion of it is converted into sulphuric acid (H_2SO_4), the amount produced depending upon the quantity of moisture present. From the experiments of Koch, Wolffhügel, and Sternberg, it has been definitely ascertained that SO_2 will not destroy spores, and that for all diseases due to spore-bearing germs, therefore, sulphur-fumigation is not an efficient mode of disinfection; while, on the other hand, it will destroy all infectious material not containing spores. Inasmuch as it is the generally accepted theory that the ordinary contagious diseases which affect mankind, small-pox, scarlet fever, measles, diphtheria, etc., depend upon micro-organisms which do not produce spores, and especially in view of the almost unanimous opinion of health-officials throughout the world as to the efficacy of this method of disinfection in the diseases named, we may, in conjunction with other means, cleanliness and the use of germicide solutions, rely upon the gas produced by burning sulphur, as an efficient agent in the destruction of the infection of these diseases; while, for all diseases which depend upon spore-producing germs, chlorine may be employed.

The details of the process of sulphur-fumigation are as follows: All living things, whether plant or animal, should first be removed from the apartment to be fumigated. If it is a room which has been occupied by a patient with a contagious disease, the bedding, body-clothing, carpets, and other articles should be so opened and exposed that the fumes from the burning sulphur can come readily in contact with all portions thereof. All cracks, fire-places, or other openings by which the gases can find an exit must be tightly closed so as to prevent their escape. In an iron pot, or other metallic vessel without soldered joints, should be placed equal parts of brimstone, broken into small pieces, and flowers of sulphur. The quantity of both should be not less than three pounds for every thousand cubic feet of air-space contained in the apartment. If this is of considerable size or length, a number of pots or kettles should be provided, the total amount of sulphur burned to be based upon the proportion of three pounds to each thousand cubic feet of air-space to be fumigated. Everything being in readiness, sufficient alcohol should be poured on the sulphur to moisten it, and a lighted match applied. As soon as it is seen that combustion is well under way, the operator should at once withdraw, as the fumes are exceedingly irritating to the air-passages, and tightly close the door, plugging keyhole and cracks to prevent escape of the gas. At the end of twelve hours the process is completed, and the room may be again opened. This must be done with caution, there being enough of the gas still present to cause suffocation, if breathed deeply into the lungs. If a window can be opened from the outside, the fumes will find their way readily into the open air; if this cannot be done, a cloth wet with water may be held over the mouth and nose, and a hurried entrance made and a window thrown open from the inside; or, if this is impracticable, all the windows of the house may be opened, and then the door of the room, and the fumes will soon escape until the apartment is well freed from the gas; no one entering it should inhale the air, on account of its irritative effects. The same plan of fumigation is to be adopted in the case of ships, care being taken that all planks are removed which are so placed as to prevent full and free admission of the gas to all parts. Yellow-fever has been known to break out in a ship even after this fumigation, owing to the presence of filth between the ship's timbers, doubtless containing the germs of the disease, and the infection was not eradicated until this was removed. At the quarantine grounds of New Orleans sulphurous acid gas is forced into the hold of the ship by a powerful blower, thus, it is claimed, causing the penetration of the gas to parts which, in the ordinary fumigation, would not be reached.

(J. H. R.)

See Vol. IX. p. 734 Am. ed. (p. 836 Edin. ed.)

FUR. Since pre-historic times the skins of many of the mammalia of frigid regions, with their cold-defying layer of fine hair, have been worn by the inhabitants of these severe climates as a protection against the wintry chill. Throughout historical times the finer, rarer, and more beautiful of these furs have been articles of luxury or ostentation, and we have abundant records of their use in early China, in the ancient empires of the West, and throughout the Middle Ages down to the present time. The north of Europe and Asia long supplied the principal furs, the Baltic ports being the centres of distribution. But the discovery of America, with its very numerous fur-bearing animals, changed the current of the fur-trade, and very greatly added to the annual supply. Though the highly esteemed sables and ermines came only from Europe and Asia, yet America had the beaver, then held in high estimation, the martin, the mink, several choice varieties of the fox, the raccoon, opossum, muskrat, and other small fur-bearing animals, with the valuable fur-seal, and several larger animals with skins of marketable value, so that it offered a rich field for adventure in this lucrative trade.

At an early date the Dutch East India Company established an active fur-trade within the limits of the United States, centring at New Amsterdam and some other points. This was maintained from 1609 to nearly the end of that century. During the same period the French of Canada displayed great enterprise in the same trade. The Indians were induced to seek energetically for furs, and to part with them for a trifling compensation. The French themselves became very expert as hunters. There were never more daring and active adventurers than the *voyageurs* and *couriers des bois*, or wood-rangers, of the French fur-trade. They were the pioneers of the settlements of Northern America, penetrating into the wildest regions, braving all perils, and paving the way for more quiet settlers. They adopted the habits of the Indians, grew in time vagrant and vagabondish, and obtained an undesirable reputation. Forts were established in the Indian Territory to protect the trade, the one at Mackinaw becoming an important centre, while the enterprise of the traders extended to Hudson's Bay in the north, far to the west, and southward along the Mississippi Valley.

The British fur-trade in these regions was inaugurated by the charter granted in 1670 by Charles II. to Prince Rupert, the Duke of Albemarle, and others, giving them control of the Hudson's Straits territory. From this originated the Hudson's Bay Company, which for nearly two centuries held a monopoly of the fur-trade of Northern British America. It claimed all the territory north of a line from Hudson's Bay to the Pacific, with the exception of that occupied by the Russians and French, held this territory with a despotic control, and established a highly successful and lucrative business in spite of the persistent opposition of the French fur-hunters. This opposition gave rise in 1783 to an association of Canadian merchants, centring in Montreal, known as the North-west Company. This soon became a powerful competitor, its factories reaching the Pacific coast by 1805. In 1813 it gained possession of Astoria, on the Columbia River, with the property of the Pacific Fur Company. The hostility of the two great companies increased, until for two years they were in a state of actual war. These difficulties ended in 1821, in which year the two companies united into one, under the title of the Hudson's Bay Company. The license of this company expired in 1858. It is still an active competitor for the trade, but its profits are reduced by the activity of private enterprise.

The Russian American Fur Company of Alaska carried on a very extensive trade for a long period, but transferred its rights to the United States on the purchase of Alaska by the latter country in 1867. The most important existing feature of the fur-trade in this region is the hunting of the highly valuable fur-seal. The Aleutian Islands of St. Paul and St. George, greatly frequented by these animals, were leased to the Alaska Company in 1870, the annual catch being strictly limited by the terms of the lease to 100,000 animals. The killing of this number has not perceptibly decreased the stock of seals. There is no restriction on the hunting of other fur-animals in Alaska, and it is open to individual enterprise. The fur-trade of the United States was long conducted by individuals. It led to the early settlement of the Western Territories. This originated in a company formed in New Orleans in 1762, which in 1763 established a trading centre on the site of St. Louis, from which eventually arose the city of that name. Prominent members of this company were Auguste and Pierre Chouteau, whose names long remained identified with the fur-trade of the West. The fur-traders and hunters pushed their way far through the wild regions of the West, despite the opposition of hostile tribes, until they reached the Pacific in 1810. The furs collected throughout this vast region were floated down the streams, shooting the rapids in canoes, or borne on men's backs around shoals and cataracts. The trade was a highly dangerous one, it being stated that of the men employed from 1825 to 1830 two-fifths lost their lives in the service. For the 15 years preceding 1804 the average value of the St. Louis furs was $203,750. In 1808 the Missouri Fur Company was established, but during the war with Great Britain it was dissolved. In 1827 the Rocky Mountain Fur Company was formed. More recently the trade has been in the hands of individuals, and, while the collection of furs has greatly increased, the profits of the trade have considerably diminished. This trade had much to do with the early settlement of the Western Territories. Up to 1848 it was the sole interest of Minnesota, while as late as 1844 Lake Superior was visited only by the agents of the fur companies.

The most prominent name in the fur-trade of the Eastern United States is that of John Jacob Astor, who engaged in the business in 1784. After a long and highly profitable connection with this trade he founded, in 1808, the American Fur Company, with a capital of $1,000,000. This company in 1811 was merged into the South-west Company. He afterwards became connected with the Pacific Fur Company, which in 1810 founded the town of Astoria, at the mouth of the Columbia, in Oregon. This enterprise did not prove profitable, and the property and settlement were treacherously sold, in 1813, by Mr. Astor's principal Canadian partner, to the North-west Company. After that period his operations were confined to the region east of the Rocky Mountains, and he acquired in time an immense fortune from his profitable trade. Since the settlement of Minnesota, St. Paul has become an important centre for the Western fur-trade. The other important American centres are the cities of New York, Boston, Montreal, and St. Louis. In Europe the cities of London and Leipsic are the best markets for American furs, as they long have been for those of other countries. At the annual fair of Leipsic furs in great quantities and of immense value change hands, while the fur-trade of London is of enormous proportions. Though the market preparation of furs is largely conducted abroad, yet this industry has attained very respectable proportions in the United States, the value of American dressed furs in 1880 being $8,238,712, while the raw materials were valued at $5,338,242.

(C. M.)

FURNESS, Horace Howard, an American lawyer and Shakespearian scholar, was born at Philadelphia, Nov. 2, 1833. He is a son of Rev. W. H. Furness, D. D. He graduated at Harvard College in 1854, and was admitted to the bar in 1859. He has written some legal articles, but is especially known by his valuable Variorum edition of Shakespeare's plays, *Romeo and Juliet* (1871), *Macbeth* (1873), *Hamlet* (1877). His library is one of the best in the world in this department of literature. His wife, who died Oct. 31, 1883, had been his diligent assistant, and published a *Concordance to Shakespeare's Sonnets*.

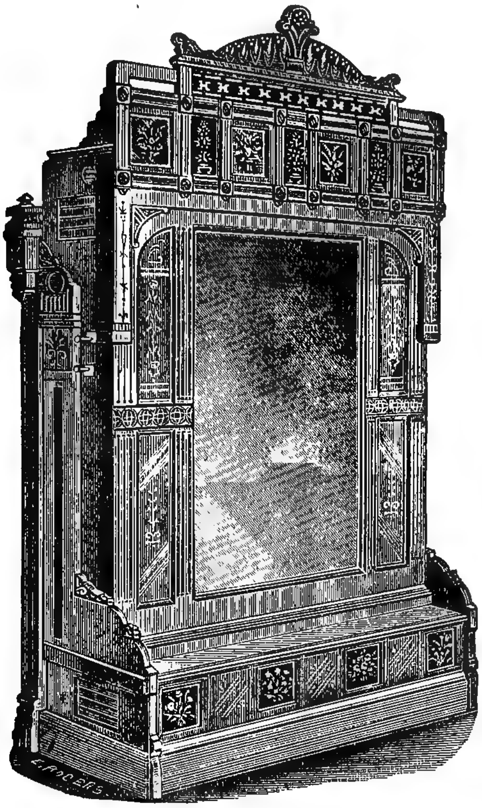
FURNESS, William Henry, an American Unitarian clergyman, was born at Boston, Mass., April 20, 1802. He graduated at Harvard College in 1820, studied theology at Cambridge, and was ordained pastor of the First Unitarian Church of Philadelphia in 1825. In 1880 he was made pastor emeritus, but he still continued to preach occasionally. During the anti-slavery movement he was noted for his active sympathy with the oppressed. He has published *Family Prayers* (1850), translations from German poets and prose writers, and many sermons. His literary labors, however, have chiefly been concerned with the character of Jesus, and the results of his studies of the Gospels have been set forth in the following works: *Remarks on the Four Gospels* (1836); *Jesus and his Biographers* (1838); *History of Jesus* (1850); *Thoughts on the Life and Character of Jesus of Nazareth* (1859); *The Veil partly Lifted* (1864); *Jesus* (1871). All his works show religious earnestness and a refined literary taste.

See Vol. IX. p. 745 Am. ed. (p. 847 Edin. ed.).

FURNITURE. In considering the question of house-furnishing we are obliged, from the very nature of the subject, to observe it from two points of view—that of the fine arts and that of utility. It stands between these two great fields of human endeavor. The effect of furnished apartments is as much injured to the cultivated taste by too strict attention to the ornamental as by rigid confinement to the practical. Of the two sins the latter is the least. The primary purpose of furniture is use. Ornament is a secondary consideration. It is subordinate in function to use and fitness. Yet, these prime necessities being duly attended to, the questions of grace, beauty, and harmonious effect come into the foreground, and a well-furnished apartment should be at once a source of pleasure to the cultivated eye and of comfort to the weary body.

If we briefly consider the history of furniture in the past it is to find these two ideas gaining successively undue control, now the ornamental, now the practical, rising into supremacy, while only at intervals these essentials became harmoniously combined, and house-decoration became truly artistic. In recent times several false conceptions have dominated in the art of furnishing, greatly to its detriment. The fashion of imitating oriental designs, often with very poor taste and effect, and of reproducing antique and mediæval forms and decorations, has proved injurious to the true development of this art. The methods here alluded to grew naturally in adaptation to the needs of life and character of habitations in the periods and regions referred to, and are out of true harmony with the modes of building and domestic requirements of modern civilized lands. In addition to this a tendency to over-decoration has prevailed, while utility has been thrust somewhat into the background. As a result we have passed through an era of monstrosities, of garish and tricky conceits, eccentric forms and coloring, unartistic in themselves, out of accordance with the purpose of the objects, and with little thought of adaptation to the apartments for which they were intended. More recently the art is passing into a more natural stage, and efforts being made to give to furnished rooms a harmonious and picturesque effect, by due attention to pleasing combinations of color in wall-paper, carpets, and upholstery, to just relations of form, and to subordination of the ornamental character of each article to the general effect, and to the form and character of the apartment furnished. This, however, is rather a tendency than a realization, artistic taste being yet at a low ebb in the community at large, and show and luxury being more regarded than grace and beauty.

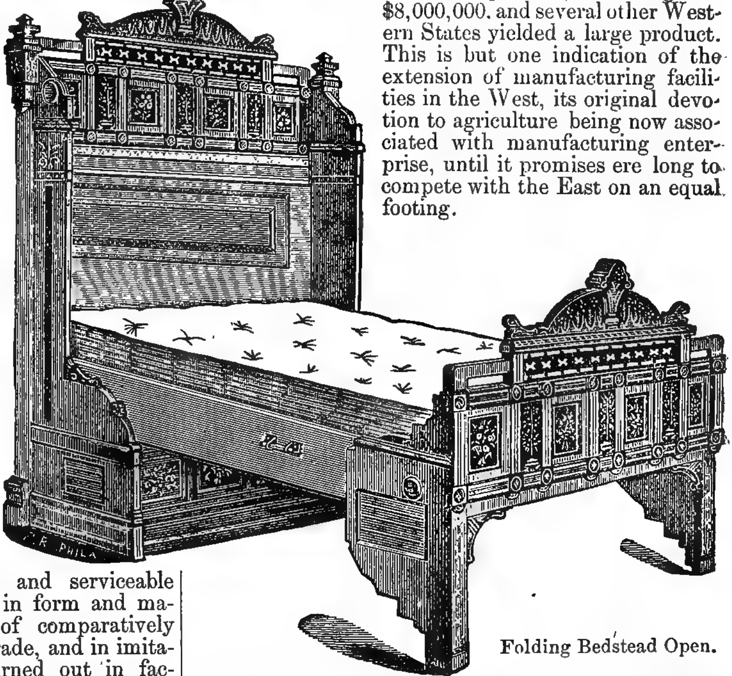
The influence of schools of design, exhibitions, etc., has been very important in the education of the public taste, and a rapidly growing attention to the subject of house decoration is being aroused. This has been greatly aided by the efforts of some few originators of artistic furniture, such as the firm of Morris & Co., of London, and the widespread adoption of their designs by other manufacturers; while in the great houses of modern times the details of the furnishing are given into the hands of skilled artists, and each room, as far as possible, is wrought into a harmonious and attractive picture.



Folding Bedstead Closed.

All true art in furnishing renders in good taste and pleasant effect the needs of modern life, and even in humble habitations it need not be lost sight of, though the exigencies of the situation necessarily subordinate beauty to utility in the latter case. More than nine-tenths of the supply of modern furniture is made for the use of the poorer and the middle classes, and to these cheapness is a primary requisite. And to the demands of cheapness durability is greatly sacrificed. Furniture of this grade is made by machinery in large factories, its defects being hidden by glue, putty, varnish, and paint. To this may be added a considerable production of hand-made furniture of more durable and serviceable character, though not very elegant in form and material. Yet a very large supply of comparatively low-priced furniture of a higher grade, and in imitation of superior styles, is now turned out in factories, much of it in form, design, and coloring of artistic character, and lending itself well to the demands of domestic art. The use of mahogany in the better class of furniture, once so common, has grown more rare of late years through the scarcity of the finer grades of this wood. The Baywood mahogany now largely used is lighter colored and without the handsome grain of the Spanish variety. This once favorite wood was succeeded in public favor by rosewood, and more recently by black walnut, whose fine grain and susceptibility to polish have brought it into high esteem as a cabinet wood. More recently several other woods have come into general use, and the field of choice of the furniture-maker has considerably widened. Prominent among these are ash, cherry, and oak; what is known to the trade as "quartered oak" being largely used in the manufacture of *antique oak* furniture. In this, the log is cut into wedge-shaped quarters, and the boards sawn from these. Other woods are used to a less extent, and several scarce and costly woods, such as satinwood, are employed for inlaid finishing. It may be said here, however, that the great advances in the arts of varnishing and staining have to some extent rendered cabinet-makers independent of material. Ebony, rosewood, and in fact almost any wood, can be imitated so perfectly that only an expert can detect the cheat. Stained rosewood can only be distinguished from the real wood by its lighter weight. The great extension of upholstering has also, while adding to the beauty of furniture, given opportunity for a large use of inferior woods, and, in conjunction with the arts of staining, varnishing, and veneering, has rendered possible the production of artistic effects at a moderate cost and in comparatively humble homes.

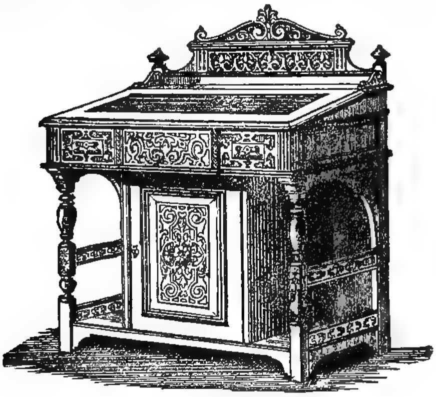
The furniture industry of the United States has greatly extended of late years, and it is of rapidly growing importance. In 1850 there were in existence 4242 establishments, with a product valued at $17,663,054. In 1880 the number of establishments had become 5227, while the value of the product had increased to $77,845,725. Of this sum the chair product alone was valued at $9,807,823. Its most noticeable recent feature is the rapid extension of the industry in the West. The chief manufacturing States in 1880 were, New York, $16,615,017, and Massachusetts, $9,332,455, while Illinois equalled Pennsylvania in value of product, each being over $8,000,000, and several other Western States yielded a large product. This is but one indication of the extension of manufacturing facilities in the West, its original devotion to agriculture being now associated with manufacturing enterprise, until it promises ere long to compete with the East on an equal footing.



Folding Bedstead Open.

Folding Furniture.—The crowding of large families into small spaces has considerably developed the "folding" or "combination" furniture. The greatest space occupied in furniture is the bed, and it is naturally desired to change its position from the horizontal to the vertical during the day, thus reducing its occupancy of space. By giving it the appearance, when thus vertical, of some other article of furniture, it is easy to convert the living-rooms of the family into bed-chambers at night, without evidence of this employment during the day.

Folding furniture is made under a variety of patents, all of which embrace one general principle, the difference being in the mode of its application. In one instance the piece of furniture will represent during the day a wardrobe erect against the wall. The front of this seeming wardrobe is movable on hinges at the bottom, and is readily brought forward and downward, revealing the mattress and bed-clothing which have been shut up and concealed from view. By the aid of weights which balance the bed and its support, this movement is easily made. In the morning a slight lifting force throws the bed again into the vertical position, and the seeming wardrobe reappears.



Combination Desk and Washstand.

Many other articles of furniture are thus imitated, frequently a large mirror forming part of the front, and aiding to conceal the true design of the article. Bookcases and writing-desks are thus imitated, neither being a sham, but both capable of use. The inkstand even may be enclosed, being swung in gimbals, so as to remain upright whatever the position of the desk. In all such cases the back portion of the article of furniture serves as the head-board to the bed. In some patents, where the articles represented are low, the front is arranged not only to lower but also to be drawn out, so giving proper length to the bed. Lounges and sofas are also converted into beds. These are made double, and pull open horizontally, the lounge or sofa seat forming half the bed, while an extra mattress has to be supplied to complete its width. Similar combinations in other articles of furniture are quite common. (C. M.)

FURNIVALL, Frederick James, an English philologist, born at Egham, Surrey, Feb. 4, 1825. He studied (1841–42) in University College, London, and was matriculated in the London University. He graduated B. A. at Trinity Hall, Cambridge, in 1842. In 1846 he became a zealous and active supporter of F. D. Maurice, in his efforts to improve the condition of the laboring men of London, and for ten years he was engaged in the Working Men's College. In 1854 he became secretary of the Philological Society. He edited for that society *Early English Poems and Lives of Saints* (1862), and was for a time editor of the society's great English dictionary. In 1864 he founded the Early English Text Society, and was its editor-in-chief. In 1868 he started the Ballad Society and the Chaucer Society. In 1873 he established the New Shakspere Society. He has edited a very large number of early English texts, and through his societies has raised large sums for their publication.

FUTURE STATE. The universal instinct of humanity expects a future life. The Scriptures reveal it. Speculations concerning it have been innumerable. The literature of this subject was very thoroughly indexed by Dr. Ezra Abbot in 1864, and the exhaustive treatise was published as an appendix to W. R. Alger's *Doctrine of a Future Life.*

The future state is the *condition* of the future life. All nations in their creeds have a two-fold condition in the future life—one of happiness and the other of misery. Some have a third condition of purgatory, or purification, as preceding and producing the happiness.

The denial of a future life is an effort of the mind against its natural belief, and but few reach that position. The denial of the two-fold future state seems to be likewise against nature. The ordinary language of men toward virtue and vice asserts a heaven and hell. The doctrines which limit and terminate the hell, and which make a purgatorial vestibule for the heaven, are rather philosophical than natural. They proceed from the desire to remove the dark colors from the universe and from the difficulty in joining closely earth's impurity with heaven's holiness.

Such Scripture expressions as "absent from the body and present with the Lord" (2 Cor. v. 8), "I desire to depart and be with Christ" (Phil. i. 23) seem to show that the heavenly state follows immediately on the body's dissolution. The "spirits in prison" of 1 Peter iii. 19 refer (by any interpretation) to the unbelievers of Noah's day, and by that limitation cannot prove a general purgatory. Moreover, if they were in prison after Christ's crucifixion, they were in the prison of hell as punished sinners, and not in the prison of purgatory as saints undergoing purification. Some hold that they were in the prison of sin in Noah's day and that Christ preached to them through Noah. In any case purgatory cannot be established from that text.

That the bodies of the saved will not be reunited to them till a future resurrection day is clearly taught in Scripture in many places. That a mediate body may be provided for them is argued from 2 Cor. v. 1, and from the presence of Moses with a body on the Mount of Transfiguration.

Those who believe that the saved go directly to heaven on death by parity of reasoning believe that the lost go directly to hell on death.

Many argue that both lost and saved go to an intermediate place (Hades), on one side of which is Paradise, or Abraham's bosom (Luke xvi. 23), and on the other a preliminary place to hell, and that the final disposition to heaven and hell will be made at the general judgment. (H. CR.)

G.

GABORIAU, Émile (1835–1873), a French novelist, was born at Saujon in 1835. He was the son of a notary, but enlisted in a cavalry regiment and was afterwards employed in a carriage-factory in Paris. Writing stories of military and fashionable life for the less important journals, he gradually acquired note by his humorous sketches. Then he turned to elaborate detective stories, which achieved remarkable success. The first of these was *L'Affaire Lerouge* (1866), which was soon followed by *Le Dossier No.* 113 (1867), and *Le Crime d'Orcival* (1867). These were his best, though they were followed by several more of the same character. He died at Paris, Sept. 28, 1873.

GACHARD, Louis Prosper, a Belgian historian, was born at Paris, March 12, 1800. He was a journeyman printer and went to Belgium, where, after taking part in the revolution of 1830, he was naturalized. He was placed in charge of the national archives, and not only organized that department but gathered from foreign libraries valuable documents relating to Belgian history. He published *Correspondance de Guillaume le Taciturne* (6 vols., 1847–66); *Correspondance de Philippe II. sur les affaires des Pays Bas* (4 vols., 1848–61), chiefly from the archives of Simancas in Spain; *Correspondance de Marguerite d'Autriche* (3 vols., 1867–81), and several works giving new information concerning Charles V. and Philip II.

GADE, Niels Wilhelm, a Danish composer, was born at Copenhagen, Feb. 22, 1817. At an early age he showed taste for music, and after he had obtained instruction on the piano and violin he was admitted to the royal chapel as a performer. After studying composition, in 1841 he obtained a prize with his overture *Echoes from Ossian*. A royal stipend then enabled him to study at Leipsic, whither he had been invited by Mendelssohn, and where he produced his first symphony in C minor. In the fall of 1844 he was called from Italy to take charge of concerts at Leipsic in Mendelssohn's absence. In 1848 he returned to Copenhagen, where he conducted concerts, and in 1865 became first director of the Conservatory. His works comprise eight symphonies, five overtures, four cantatas, several sonatas, a lyrical drama, *Comala*, and an opera, *Mariotta*. Gade is inferior to his master, Mendelssohn, in form, but excels him in strength and skilful use of instruments.

GAD-FLY, also breeze or horse-fly, a name given to many species of *Diptera*, or two-winged insects, from their persistent persecution of horses and other animals. The gad-flies of North America comprise over 100 species of the genus *Tabanus* alone, besides members of other genera. During the hotter parts of the summer, and especially when the sun is shining brightly, these insects appear in multitudes in marshy regions, and on prairie lands, and prove a great annoyance both to man and beast. They do not fly in cloudy weather, and die in the cool nights of September. Our most common species is *Tabanus lineola*, or the green-head fly. Its bite is very painful, its lancet-like jaws being driven deep into the flesh. Horses and cattle are occasionally so harassed by its attacks as to die in consequence. The mouth parts of the horse-fly resemble in a modified form those of the mosquito, and, as in the latter, only the female bites. The golden-eyed flies, of the genus *Chrysops*, are much smaller gad-flies, which cause great annoyance in summer by their buzzing and biting in woods and fields. The *Tsetse* fly of Africa, whose bite is said to poison and kill cattle, is a member of this group. Fortunately it does not attack man.

GADSDEN, Christopher (1724–1805), an American patriot, was born at Charleston, S. C., in 1724. He was educated in England and in 1741 returned to Charleston, where by success in mercantile business he recovered the estate which his father had lost in 1733 by gambling. He frequently represented Charleston in the colonial assembly, and was a prominent delegate to the Congress which met at New York in October, 1765. In the Continental Congress in 1774 he advocated American independence. In 1775 he was made colonel and in 1776 brigadier-general of State troops, but resigned in 1779. Being lieutenant-governor of the State in 1780 he remained at Charleston during its siege by Sir Henry Clinton, and signed the capitulation. After the surrender he was for a time prisoner on parole, but soon was transferred to St. Augustine. On his refusing to give another parole he was closely imprisoned for forty-two weeks. After his release he was chosen governor of South Carolina, but declined the office. He died at Charleston, Aug. 28, 1805.

GADSDEN, James (1788–1858), an American statesman, grandson of the preceding, was born at Charleston, S. C., May 15, 1788. Graduating at Yale College in 1806 he engaged in commerce until 1812, when he entered the army as lieutenant and served in Canada. He was an aide to Gen. Jackson in the Seminole campaign of 1818. Leaving the army in 1822 he settled in Florida as a planter, became a member of the territorial council in 1824, and a commissioner to remove the Seminoles to Southern Florida. He afterwards returned to Charleston. In 1853, being appointed minister to Mexico, he negotiated the "Gadsden Purchase," by which the United States acquired for $10,000,000 a large tract now included in Arizona and New Mexico. He died at Charleston, Dec. 26, 1858.

GAGE, Matilda Joslyn, an advocate of woman's rights, was born at Cicero, N. Y., March 24, 1826. She was married in 1845 to Henry H. Gage, and first took part in the movement for woman's rights in 1852. Besides lecturing and attending conventions she has written *Woman as Inventor*, and with E. C. Stanton and S. B. Anthony has compiled the *History of Woman Suffrage* (3 vols.).

GAINES, Edmund Pendleton (1777–1849), an American general, was born in Culpepper co., Va., March 20, 1777. His father, James, was a captain in the revolutionary war, and a member of the legislature of North Carolina. In 1790 the family removed to Tennessee. Edmund entered the army as ensign in 1799, was major at the beginning of the war of 1812, soon after colonel, and in 1814 brigadier-general. He received the brevet of major-general and other marks of honor for gallantry at Fort Erie, Aug. 15, 1814, where he was severely wounded. While in command on the Southern border he was active against the Seminoles in Florida. When Gen. Jackson took the command Gaines remained and presided over the court-martial which condemned Arbuthnot and Ambrister. He was afterwards in command of the Western district. In 1836 he conducted an expedition against Osceola, but was wounded in an action on the Withlacoochie River, Feb. 29. He died at New Orleans, June 6, 1849.

GAINES, Myra Clark (1806–1885), wife of the preceding, was born at New Orleans, Dec. 27, 1806. She was the daughter of Daniel Clark (1766–1813), an Irishman, who had settled in New Orleans and became a millionaire. Her mother, Marie Julie Carriere, at the age of thirteen had married Jerome de Grange, a French nobleman, who had fled from France in 1790. The marriage was not happy, and it was afterwards discovered that he had one or more wives living. Myra's mother, now known as Zulime, had attracted Clark's attention, and he proposed marriage, but she refused to marry until it was proved that she had a right to do so. The two therefore travelled to New York, where de Grange's previous marriage was supposed to have taken place, to get evidence of the fact, but the records of the church had been destroyed before their arrival. Zulime then consented to marriage on condition that it should be kept secret until there was legal evidence of de Grange's bigamy. She was married privately in Philadelphia in 1803 and went to reside near New Orleans. Clark subsequently neglected her, and Myra was brought up in the family of Col. Davis, whom she supposed to be her father until near the time of her marriage to W. W. Whitney, of New York. Davis then stated that Clark had acknowledged Myra as his legitimate daughter, and by a will made in 1813 had bequeathed to her his estate. Clark's partners, however, had already served as executors of a will dated in 1811 which gave the estate chiefly to his mother, Mrs. Mary Clark. Mr. Whitney instituted a search for the missing will; witnesses were found who had seen and read it, and the Supreme

Court of Louisiana in February, 1856, decided that the lost or destroyed will, as described, should be received as the last will of Daniel Clark. Mr. Whitney had already suffered imprisonment for libel in charging Clark's partners with destroying this will. Whitney died before the will was established, but in 1839 his widow was married to Gen. E. P. Gaines, who had a fortune of $200,000. Much of this was swept away in the costs of the lawsuits, and he also died, in 1849, before the end was reached. In a later suit evidence was brought to show that Clark himself had destroyed the will, and for a time Mrs. Gaines seemed to have lost all. But she persevered until, in 1861, the Supreme Court of the United States decided in her favor by a vote of four to three. After the civil war, which suspended the proceedings, the Probate Court of New Orleans refused to admit the will, but the U. S. Circuit Court interfered. Part of Clark's estate was by this time the commercial centre of New Orleans, while another part was an entire suburb, St. Johnsburg. The master in chancery to whom the case was referred reported that the city of New Orleans owed Mrs. Gaines over $1,500,000, on account of part of this property. In 1883 Judge Billings granted a mandamus on the city, and ordered the city council to lay a tax of two per cent. to pay the claim. An appeal to the U. S. Supreme Court was afterwards allowed. Up to 1874 Mrs. Gaines was said to have recovered about $6,000,000, but the legal expenses had swallowed up most of this amount. In 1861 the whole estate was valued at $35,000,000, and it afterwards increased in value. Mrs. Gaines died at New Orleans, Jan. 9, 1885. A son-in-law and six grandchildren survived her.

GALENA, a city of Illinois, county-seat of Jo Daviess county, is situated on both sides of Galena River (originally called Fevre River), 6 miles from its junction with the Mississippi; 19 miles S. of Dubuque, Iowa, and 180 miles S. E. of Chicago. Galena River was formerly navigable for any class of boats that could ascend the Mississippi, but owing to the deposit of soil washed from the bluffs on either side it is now rarely navigable. The city is on the Illinois Central Railroad, and is also the southern terminus of a division of the Chicago and North-western Railroad. It was first settled in 1819 as a mining-camp and trading-post; laid off as a town in 1826; incorporated as such in 1835, and as a city in 1839. The ground on which it is built rises abruptly from the river on either side, its streets being laid off in terraces to the tops of the bluffs, giving it a romantic appearance. The highest point in the city is nearly 210 feet above the river. The chief industry is lead-mining, which is carried on to a considerable extent, in the winter seasons principally. As a commercial centre it derived a great portion of its trade from the rich mining and agricultural regions of Southern Wisconsin. Its manufactories and other industries include a foundry and machine-shop, 2 saw-mills, sash-, door-, and blind-factory, pottery, woollen-mill, broom-factory, 2 extensive packing-houses, furniture-factory, and minor industries. Of churches there are Methodist Episcopal, 2; Presbyterian, 2; Lutheran, 2; Episcopal, 1; Catholic, 2. It has a handsome high school building, and substantial public school houses auxiliary thereto. Among the number of private educational buildings in Galena is a Dominican (Catholic) school, also the German-English college, conducted under the auspices of the North-western German M. E. Conference. Its beautiful structure, finely located, was originally the U. S. marine hospital. Galena has a fine court-house and jail, city hall, substantial business blocks, and many beautiful residences. The population of Galena in 1870 was 7019, in 1880, 6751. It was the residence of Gen. Grant at the outbreak of the civil war.

GALES, Joseph (1786–1860), an American journalist, was born at Eckington, near Sheffield, England, April 10, 1786. His father (1760–1841), who had conducted a newspaper in Sheffield, came to the United States in 1794, and published the *Independent Gazette* in Philadelphia until 1799, when he removed to Raleigh, N. C., and there published the *Register* until 1839. Joseph graduated at the University of North Carolina, settled in Washington in 1807, and became proprietor of the *National Intelligencer* in 1810. In 1812 he took his brother-in-law, W. W. Seaton, as partner, and in 1813 made the paper a daily. He died at Washington, July 21, 1860. He was an able and influential writer.

GALESBURG, a city of Illinois, county-seat of Knox county, is on the main line of the Chicago, Burlington, and Quincy Railroad, 164 miles W. S. W. of Chicago. This line of railroad extends hence westward to Burlington (Iowa), and to Omaha. From Galesburg a branch runs E. S. E. 52 miles to Peoria. Another branch connects Galesburg with Quincy, while the Fulton County Narrow Gauge Railroad (3 feet wide, 61 miles long) runs southward to Havana, on the Illinois River. The city has 3 national banks, 16 churches, 1 daily and 3 weekly newspapers, and good schools. The leading manufactures are wagons, castings, and farm-implements. There are also shops for railway repairs and construction. Galesburg is the seat of Knox College, founded in 1841 as a Presbyterian institution, but now non-sectarian, and also of Lombard College (Universalist, founded 1852). Besides the college libraries there is a large public library. The population in 1870 was 10,158; in 1880, 11,437.

GALL OF THE EARTH. This is the common name of *Nabalus Frazeri*, a plant indigenous to the Atlantic portion of the United States. It was one of the Indian remedies for the bite of venomous reptiles. It belongs to the natural order Compositæ, and was referred by Linnæus to the genus *Prenanthes*, from which it differs in the greater number of florets in the head (5–20), the greater number of involucral scales (8–10), as well as in minor particulars. There are ten species of *Nabalus* described, all perennial herbs springing from tuberous roots, with leaves usually varying much on the same plant, and with the mostly nodding flowers on the paniculate branches, of a greenish-white or slightly purple tinge. The roots of all the species are bitter, but those of *N. Frazeri* especially so, whence the common name.

GALLAGHER, William D., an American poet and journalist, was born at Philadelphia in 1808. After the death of his father in 1816, his mother removed to Cincinnati where William became a printer. He was editor of the *Backswoodsman* at Xenia, Ohio, in 1830, and afterwards of literary journals in Cincinnati. From 1839 to 1850 he was connected with the *Cincinnati Gazette*. His verses were gathered under the name *Erato* (3 vols., 1835–37), and he also published *Selections from the Poetical Literature of the West* (1841). In 1850 he became confidential clerk of Thomas Corwin, secretary of the U. S. treasury. In 1853 he removed to Louisville, was again an editor, next a farmer, and afterwards again employed in the treasury department.

GALLAUDET, an American family of Huguenot descent, noted for their labors in behalf of deaf-mutes.

I. Gallaudet, Thomas Hopkins (1787–1851), the founder of the first American institution for deaf-mutes, was born at Philadelphia, Dec. 10, 1787. His parents afterwards removed to Hartford and he graduated at Yale College in 1805. He studied theology at Andover, but, as is related in the article on Deaf-mutes (Vol. II., p. 567), devoted himself to the education of that class. He was principal of the asylum at Hartford until 1830, when he resigned on account of impaired health. In 1838 he became chaplain of the Connecticut Insane Asylum. He died at Hartford, Conn., Sept. 9, 1851. He published several religious works for the young, and edited the *American Annals* *of the Deaf and Dumb.* See his *Life* by H. Humphrey (N. Y., 1858).

II. **Gallaudet, Thomas**, a son of the preceding, was born at Hartford, Conn., June 3, 1822. After assisting in the Hartford Asylum, he was professor in the New York Institution from 1843 to 1858. In 1850 he was ordained to the Episcopal ministry, and in 1852 founded St. Ann's Church for deaf-mutes. He also assisted in establishing services for deaf-mutes in Albany, Boston, Philadelphia, and Baltimore. He has contributed to the *American Annals of the Deaf and Dumb.*

III. **Gallaudet, Edward Miner**, brother of the preceding, was born in Hartford, Conn., Feb. 3, 1837. After two years' experience as instructor in the Hartford Asylum, he was, in 1857, made principal of the Columbia Institution at Washington, D. C. (see Vol. II., p. 570). In 1864 he became president of the National Deaf-mute College, which had grown out of his efforts. His further labors are indicated in the article already referred to.

GALLE, Johann Gottfried, a German astronomer, was born at Pabsthaus, June 9, 1812. He studied at Wittenberg and Berlin, and became a teacher at Guben and in Berlin. In 1835 he was made assistant in a newly founded observatory in Berlin, and enjoyed Encke's instruction. In three months, about the end of 1839, Galle discovered three new comets, for which he obtained the Lalande prize. On Sept. 23, 1846, he received a letter from Leverrier requesting him to examine a certain part of the sky for an unknown planet, and, by the aid of a map which had just been completed by Dr. Bemicker, was so fortunate as to discover the planet Neptune that very evening. This event marks an era in the history of astronomy. Galle continued to make further discoveries, and since 1851 has been professor of astronomy and director of the observatory at Breslau. He has published many articles in the *Astronomische Nachrichten* and other scientific journals.

GALLITZIN, Demetrius Augustine (1770–1840), a Russian nobleman who became an American missionary, was born at the Hague, Dec. 22, 1770. His father, Prince Dimitri Gallitzin, while ambassador at Paris, embraced the views of Voltaire, but his mother, after a dangerous illness, became a Roman Catholic in 1784, and three years later Demetrius also professed that faith. He had been destined for military life, and had been commissioned as a captain of the Russian imperial guard. In 1792 he was sent to America, partly to examine the institutions of the country and partly to overcome his natural timidity. He was received with great cordiality by Bishop John Carroll of Baltimore, and soon after his arrival entered the theological seminary of that city. His parents opposed his desire to become a priest but he persevered, and after entering the order of the Sulpitians was ordained, March 18, 1796. He officiated first at Conewango, Pa., then travelled as a missionary, visiting the Catholics scattered through the wilder parts of Pennsylvania and Virginia. In 1799 he determined to take up his abode at Clearfield, Cambria co., Pa., and purchased a large tract of land to be given to Catholic families. Having assumed the name Smith, he was thus naturalized in 1802, but in 1809 was permitted by the legislature to resume his family name. On his father's death he had been declared disqualified to inherit the estate, and though his mother sent him money he was much embarrassed by the expenses incurred for his colony, which he had named Loretto. Still he struggled to hold it, and is said to have spent on it altogether $150,000. The wilderness in which he had settled was before his death transformed into a thrifty community. Besides Loretto, a village named Gallitzin had sprung up. He steadily refused preferment in the church, devoting himself entirely to his colony. He died at Loretto, Pa., May 6, 1840. Ten years later a monument was erected over his remains in front of the church in which he had ministered. During his life he had carried several controversies with surrounding Protestants, and his letters were published in pamphlet form. See his *Life* by Sarah M. Brownson (1873).

GALLOWAY, Joseph (1730–1803), an American loyalist, was born in Maryland about 1730. He practised law in Philadelphia, and in the Pennsylvania legislature in 1764 he strongly supported the movement for changing the government of the colony from the proprietary to a royal form. (See American Colonies, Vol. II., p. 305.) In 1774 he managed to be elected to the Continental Congress, and there proposed a scheme of government for the United Colonies closely resembling that now in use in Canada. But when the movement for independence grew stronger he became strenuous in opposition. He joined the British troops in New York in 1776 and afterwards returned to Philadelphia, but in 1778 he went to England. Before a committee of the House of Commons in 1779 he made severe strictures upon Sir William Howe and other British officers. He also published pamphlets on the causes and consequences of the American revolution. He was the ablest, most influential, and most violent of the loyalists. He died in England, Aug. 29, 1803.

GALT, Sir Alexander Tilloch, a Canadian statesman, was born at Chelsea, England, Sept. 6, 1817, being a son of the distinguished novelist, John Galt. From an early age he was in Canada in the employ of the British and American Land Company, and from 1844 to 1856, as the sole manager of its estates, conducted it from insolvency to prosperity. In 1849 he was elected to the Canadian Parliament, and since 1853 he has been the representative of Sherbrooke. Being minister of finance in the Cartier cabinet from 1858 to May, 1862, he arranged a tariff which improved the provincial credit, consolidated the public debt, and negotiated in England an important loan. He again held this position from March, 1864, to August, 1866. He had always advocated the union of the British North American provinces, and in 1866 was sent as a delegate to London to promote the formation of the present Dominion of Canada. He was again minister of finance in 1867–68 under the new government, and soon after was knighted. In 1875 he was appointed a commissioner under the Treaty of Washington, and in 1877 was the representative of Great Britain in the Fishery Commission at Halifax. In 1880 he was appointed the diplomatic representative of Canada at London. His valuable services in behalf of his country have procured for him many marks of honor. He has published *Canada*, 1849–1859 (1860).

GALTON, Francis, an English traveller and author, was born in 1822 at Dudderton, near Birmingham. He is a grandson of Dr. Erasmus Darwin. He graduated at Trinity College, Cambridge, in 1844, then travelled in North Africa, visiting the White Nile, and in 1850 explored the western part of South Africa. For this exploration he received in 1852 a gold medal from the Royal Geographical Society, of which he was afterwards secretary for some years. He was general secretary of the British Association from 1863 to 1868; president of its geographical section in 1872, and of its anthropological sub-section in 1877. He has published *Narrative of an Explorer in Tropical South Africa* (1853); *Art of Travel* (1858), a very popular handbook of directions; *Meteorographica* (1863), a weather chart; *Hereditary Genius* (1869); *English Men of Science; their Nature and Nurture* (1874); *Experiments in Pangenesis* (1880).

GALVESTON, the chief city of Texas, county-seat of Galveston county, is on the N. E. end of Galveston Island and at the mouth of Galveston Bay. It is 290 miles W. of New Orleans and 180 miles E. S. E. of Austin. The first census of the population in 1850 gave the number of inhabitants as 4177, in

See Vol. X. p. 49 Am. ed. (p. 53 Edin. ed.).

1860 it was 7307; during the civil war the population was much reduced, but in 1870 it had risen again to 13,817; in 1880 it was 22,253, but the present population exceeds 30,000. There are two main lines of railway—the Galveston, Houston, and Henderson, now a part of the Missouri Pacific system, and the Gulf, Colorado, and Santa Fé, now operating about 700 miles of main line and branches—reaching the central, northern, and eastern portions of Texas. These two railroads reach the city from the mainland on two trestle bridges, each over 2 miles long. Another road, narrow gauge, the Texas and Mexican, has been built only about 20 miles down the island. The whole length of the island is 33 miles and its breadth from 1 to 4 miles. It is intersected by many bayous, and contains several fresh-water ponds. The beach of the island is smooth and hard, and furnishes a fine drive.

The city of Galveston contains an area of nearly 5000 acres, and is laid off in squares 260 by 300 feet, with wide streets, intersecting each other at right angles. Much attention is paid by householders to shrubbery and trees on sidewalks, and there are many elegant private dwellings, handsome public buildings, and fine business blocks. There are 29 churches of the various denominations, 10 of which belong to the colored people. St. Mary's Cathedral is a fine building, and many of the Protestant denominations have elegant edifices. The Hebrews have a fine synagogue. The public-school system is admirable, controlled by the city, and accommodating all classes. St. Mary's University (Roman Catholic) was founded in 1855 and has about 150 students, chiefly in the preparatory department. There is also a medical school, good libraries, and an orphanage.

Galveston has over 20 hotels, 2 national banks, 3 other banks, and several private banking-houses, with an aggregate capital of $2,000,000. Two daily and 5 weekly newspapers are published here. Owing to the limited supply of fresh water manufactures have not been largely engaged in. The principal are the city gas-works, Brush electric-light works, cottonseed-oil mill, ice-factory, 4 sash- and blind-factories, flouring-mill, brass- and iron-foundries, and 6 cotton-compresses. The principal exports of Galveston are leather, wool, hides, and cottonseed-oil and cake. The principal imports are from South America, Great Britain, and other foreign countries, and include coffee, salt, iron ties. and iron rails; from domestic ports are brought groceries, dry-goods, and general merchandise. The annual exports and imports now amount to $35,000,000, cotton being the chief article of export.

The harbor of Galveston is on the north or bay front of the city, and has capacity for a very large commerce. At the entrance to the harbor from the Gulf of Mexico there is a bar of crescent shape of an average width of ¾ mile, on which bar there is a depth of water on average tides of 13 feet. Efforts have been made by the general government to increase the depth of water on the bar, so as to admit the largest class of sea-going vessels, but little or no effective work has been done.

History.—The progress and condition of Galveston may be divided into four epochs: First, the days of the filibusters and buccaneers from 1816 to 1820, followed by the almost total depopulation of the island for some ten years. Herrera, the minister of the Mexican patriots, having learned the capacity of Galveston harbor, determined to take possession of it. He accordingly sailed to the island and landed on Sept. 1, 1816, having with him Commodore Aury in command of a fleet of 12 vessels of the republics of Mexico, Venezuela, La Plata, and New Grenada. On Sept. 12 a government was organized, and Aury was chosen governor of Texas and Galveston Island, taking an oath of allegiance to the republic of Mexico. Other departments of government were organized and officers elected; and Aury's vessels being sent out to cruise against Spanish commerce swept the whole Gulf of the shipping of the mother country. Meantime Xavier Mina, who had distinguished himself in the Peninsular war against France, entered into an arrangement with Toledo to wrest Florida from Spain; but when Toledo went over to the king of Spain, Mina sailed to Galveston to co-operate with Aury and Perry, landing here on Nov. 24, 1816. Aury's cruisers made Galveston prosperous for the time. Among the prizes taken were many Spanish slavers, but as there was no market for slaves in Texas the captors sought a market for them in the United States. Companies were formed in Louisiana who received them either at Sabine, Point Bolivar, or Galveston, took them to a custom-house officer in Louisiana, denounced them as imported slaves, had them sold under the law by the marshal, and repurchased them, pocketing half of the purchase-money as informers. The forces in Galveston consisted of about 350 men under Aury besides his fleet; and there were 200 under Mina, while Col. Perry commanded 100 men at Bolivar Point on the mainland. They sailed or marched to take part in the war of Mexico against Spain. A few days after Aury and all his men had sailed from Galveston Lafitte and his buccaneers arrived. By the close of 1817 Lafitte's followers in Galveston numbered about 1000 men. The town built by Lafitte on the ruins of that of Aury was called Campeachy. About this time Gen. Lallemand, an artillery officer under Napoleon, came to Galveston with about 100 Frenchmen. Proceeding a short distance up the Trinity he built a fort, intending to cultivate the soil, but was induced to abandon the enterprise owing to the hostility of the Spaniards. His followers returned to Galveston, and a part of them remained with Lafitte. The buccaneers were finally driven away by a U. S. naval vessel. The floating population of the island, during the days of the filibusters, varied from 50 to 1000. Lafitte had established quite a town, mostly of low wooden buildings. The project of establishing a city on the east end of Galveston Island, formed in 1837, first took shape in the winter and spring of 1838. Prior to the battle of San Jacinto, and after the expulsion of the Mexican authorities in 1835, Galveston had no regular commerce, although vessels frequently arrived with immigrants and supplies in aid of the Texas revolution. In 1835 a military post was established by Texas and maintained until after the expulsion of the Mexicans from the country in 1836.

The present site of the city was acquired from the republic of Texas under special grant by M. B. Menard and associates, and its first incorporation as a municipality was in March, 1839. Its population at that time was about 1000. The settlements in this portion of Texas were confined to a few counties contiguous to the coast, and the commerce was correspondingly limited. The foreign trade began in February, 1840, when a French vessel arrived with a cargo, and in the following winter British and German vessels followed. After Texas was annexed to the United States the commerce of Galveston steadily increased. The secession of Texas led to the blockade of the port during the civil war. It was captured by the U. S. forces Oct. 8, 1862, but was regained by the Confederates Jan. 1, 1863. Since the close of the war Galveston has recovered its commercial importance. The greatest conflagration in this city occurred on the night of Nov. 12–13, 1885. It started in a steam planing-mill, and, being spread by a stiff north wind blowing at the rate of 30 miles an hour, it destroyed within 5 hours 47 blocks of the most densely populated portion of the city. The area of the burnt district was about 100 acres and contained 500 dwellings. The property burnt was valued at $2,000,000, on which there was an insurance of $1,200,000, which sum was nearly all paid within a month. This promptness enabled building to be undertaken at once, and the new houses are superior to those which they replace, greatly improving the city.

GALVEZ, Bernardo de, Count (1756–1786), a Spanish general and colonial governor, was born at Malaga in 1756. He was the son of Don Mathias Galvez, viceroy of Mexico, and his uncle, Don José de Galvez, was president of the council of the Indies. Bernardo, after some military experience in France and Algiers, was appointed colonel and governor of Louisiana in 1776. He assisted the Americans in the revolutionary war, and commanded expeditions, which, in 1779–81, captured from the British various posts from Baton Rouge, as far east as Pensacola. He was made lieutenant-general, with the rank of count, and in 1784 was appointed captain-general of Louisiana and Florida. Early in 1785 Cuba was also placed under his government, and a few months later, on the death of his father, he succeeded to the vice-royalty of Mexico. He built the palace of Chapultepec, but the vastness of this undertaking brought him into suspicion in Spain. He died of vexation in consequence, at Mexico, Nov. 30, 1786.

GAMBETTA, Leon (1838–1882), the greatest of French Republican leaders, was born at Cahors, a small city of the south of France, April 3, 1838. His family was originally from Genoa. Those who seek to mark everywhere the influence of race note in his character a strong dash of Italian strategy and subtlety. His father, who survived him, was a small shop-keeper. His mother, who died only a year before him, was a woman of strong native intelligence, and, though herself denied all opportunity of culture, capable of appreciating its advantages to the full. Accordingly, with her strong will and perseverance, she bent all her efforts to give a superior education to her son, who, from his earliest years, showed a richly endowed nature. He studied at the modest provincial college. Educated in the faith of the majority of his countrymen, he made his first communion in the Catholic Church, though his piety never appeared to be fervent. Later he withdrew entirely from Catholicism, as the enemy of all liberty, and never was able to distinguish between Christianity and Ultramontanism. In this regard he shared the unfortunate error of the great majority of his fellow-countrymen. Philosophical studies never interested him ; without close personal examination he accepted the convenient solutions of positivism as presented by Auguste Comte and Littré, who discard at the outset the investigation of causes and principles, and concentrate their attention entirely upon the world of phenomena. Such a system permits one to pose as a free thinker by dispensing with thought on the grandest questions which can occupy the human soul.

Gambetta, thanks to the mother who had faith in him and who shrank from no sacrifice to assure his future, went to Paris about 1858 to study law before he attained his twentieth year. He was accompanied by an aged aunt, who kept house for him as long as she lived. To her tender and unwearied care for his wants he returned a great and respectful affection.

Gambetta did not push his study of law very far, but contented himself with what was necessary to his assuming the advocate's robe. His chief study was in the political and historical sciences. His instinct impelled him to action, to direct influence on the spirits of others by his eloquence. Even at this early stage of his career he exercised a veritable fascination on his friends. He dazzled them with his ardent imaginative speech, in which the sallies of a lively and keen wit were mingled with large views and generous and fruitful ideas. Gambetta was the true representative of his generation, the inspired organ of its protest against Napoleonic Cæsarism. Still an opportunity was needed to bring him forward upon the grand stage of contemporary history; this came to him suddenly in the Baudin trial in 1868. This was the prosecution brought against the journals which had opened a subscription to raise a monument to the memory of that heroic representative of the people slain Dec. 4, 1851, while fighting on the barricade against the soldiers of the *coup d'état*. Among the accused appeared the famous Delécluze, destined to so mournful a fate in the days of the Commune, and as his advocate appeared Gambetta. It was really the Empire and the *coup d'état* that were on trial. On that day the young advocate, but yesterday unknown outside of the circle of his intimate friends, rose at once to glory by a speech which was a thunderbolt against the Empire. In that harangue of Nov. 14 the public conscience, long condemned to silence, found utterance, and by its uncompromising verdict rendered amid the frantic applause of a whole people, proclaimed to the usurping government that no statute of limitations covered the deed which had been boldly called a crime before its own tribunal. It was no mere speech that Gambetta made : it was the proclamation of the advent of a new era. It was the first revelation of the causes that were to lead to the fall of the Empire ; the moral vote of the country had on that day gone against the government.

The election of 1869 sent Gambetta to the Chamber of Deputies after a prolonged contest at Paris and at Marseilles, in which he took pronounced democratic ground, but without any admixture of socialism. In the debates of the chamber as at the bar of the correctional tribunal he displayed a timely boldness. After the first defeats of the disastrous war of 1870, when the session was resumed Gambetta was ever at the front, urging the arming of the national guard, demanding the formation of a Committee of Defence, pursuing the government with incisive questions on the military situation which they tried to conceal, ever finding words of patriotism adequate to the increasing gravity of the crisis. On Aug. 13, 1870, he pronounced this decisive word : "It must be made clear whether we here (in this house) have made our choice between the salvation of the country and the safety of the dynasty." To the fallaciously optimistic declarations of the ministry, which was endeavoring to delude the people, the orator replied with the terrible apostrophe : "I consider that we have been silent long enough ; that for too long a time has the veil of secrecy been cast over the events which are rushing upon us. It is my profound conviction that this country is hurrying towards an abyss and knows it not." When interrupted by the hirelings who dared assert that the situation caused disquiet to none but himself and his friends, with a voice of thunder he turned upon them and put them to silence : "As for you," he cried, "who have never raised your voices but with words of cringing acquiescence, whose effect is but too visible to-day, hold your peace ! The only conduct which becomes you now is silence and remorse." Does it not seem that it was the voice of France herself that, with vengeance in its tones, made itself heard in those rapid burning words ? They were few indeed, but they struck home.

On Sept. 4, 1870, Gambetta was raised to power, amid circumstances the most tragic. The Second Empire had been crushed by the defeat of Sedan. The Prussians beleaguered Paris. Departing hence by balloon, Gambetta reached Tours and forthwith despatched to the provinces an intensely patriotic proclamation, appealing to the country to put forth all her remaining force to drive out the invader, step by step. Gathering around him helpers as energetic as himself, among whom M. de Freycinet was conspicuous, Gambetta did everything to organize the means of resistance. The Army of the Loire was the first reorganized, and, under the command of the brilliant Chanzy, held in check for two months the Prussian army. In the north Gen. Faidherbe led into action troops hastily raised, who yet bore themselves bravely. Finally the great campaign of the east to turn back the German army was organized with an incredible rapidity. But Bazaine's surrender of Metz and his gallant army neutralized all these efforts. The veteran regiments being thus broken up, the government of national defence had only raw levies to set in array against the most admirable military organization of Europe. Nevertheless we cannot regret that terrible and bloody effort of Gambetta. Honor is worth more than success. France would have been disgraced in the eyes of history and justly, if she had not struggled till the sword broke in her hands to defend her soil, her sons and her daughters that were to be taken from her by the annexation of Alsace and Lorraine. We do not deny that during his dictatorship Gambetta made mistakes, and that in directing the generals whom he had placed in command, removing them at the first check, and imposing on them plans of campaign, he went too far. We recognize that at times he made the weight of his authority too rudely felt, and would not permit himself to be hindered in pursuit of his main object by any local liberty. His greatest error was proclaiming an electoral law which forbade the candidacy of any supporter of the Empire. This measure, published just before the convoking of the National Assembly, was repudiated by the members of the government remaining in Paris, and thus the Republic was threatened with a serious conflict. To judge the matter aright we must transport ourselves to the time. Gambetta believed that the war would be prolonged. He could not bring himself to lay down his arms; he was maddened almost by a patriotic sorrow —a noble sorrow which earned for him the generous forgiveness of all the noble spirits in the nation. In spite of the burning and implacable hatred that his four months' dictatorship had caused, he was none the less, in the eyes of the country, the personification of the national defence, and never ceased to be regarded as the Leonidas of the French Thermopylæ. This more than anything else made him the most powerful man of the Third Republic.

Nevertheless Gambetta seemed more completely defeated on the field of internal politics than on that of war against the invader when the National Assembly, elected Feb. 18, 1871, met at Bordeaux. The majority, largely royalist, was passionately hostile to him, though it also had done its duty in the army. The country, exhausted, wished for peace at any price, demanded it through the organ of its representatives, and denounced the man who pressed for war to the bitter end. Furthermore, the royalist and conservative deputies manifested a sort of furious rage against the democratic dictatorship of the young tribune. Unwilling to take part in the vote on the treaty of peace, he resigned and retired to St. Sèbastien. When the commune of Paris let loose the horrible and criminal war which bathed the streets in blood and seemed destined to consummate the ruin of France, irretrievable defeat seemed to be the doom of the Republican party and its eloquent leader. Yet M. Thiers was able to establish the Republic, thanks to his firmness, to his promptness of resolution, to the ability with which he profited by the dissensions of the royalist party. Gambetta, restored to Parliament by Paris through the complementary elections of July 2, 1871, found himself thrust in the background, the leader of a feeble minority. Little by little he regained his influence, speaking on all the great questions where the predominant interests of the country were at stake. He also embraced every opportunity to address the masses of the people in order to maintain and develop in them a love of the new institutions, but carefully steered clear of all compromise with the spirit of disorder and anarchy. As a man and as an orator he daily put forth new strength; the wrongs that were heaped upon him by the royalist and clerical majority served only to increase the authority which he wielded outside of Parliament. Affairs underwent a speedy change after the overthrow of M. Thiers. Within a few months Gambetta became the leader of the entire Republican party —the leader that was to conduct it to victory. Then, indeed, a great change was seen in him, or rather the new circumstances revealed in the man, known only as a popular leader of unsurpassed audacity, a statesman cautious, capable of self-restraint, and able to carry out a far-reaching plan. Thanks to this wisdom Gambetta became really the second founder of the Republic by obtaining from his own party the concessions without which a majority of votes in the Assembly could not have been obtained for the Republican constitution. By the combined efforts of Gambetta and of the Republican adherents of M. Thiers this fundamental measure was passed in February, 1875, by an Assembly which four years before had been controlled by the temporary royalist coalition. On May 16, 1877, with an adroitness equal to his energy, Gambetta led the opposition to the *coup d'état* attempted by Marshal MacMahon and the royalist factions against the Republic.

We have now arrived at the most debatable period of Gambetta's public career. As he himself said, "The Republic's hour of peril was followed by its hour of difficulties." The most serious of these difficulties was, in truth, the removal of its perils. Danger had united the Republican party and carried it on to victory. When the party found itself master of the country it divided anew. The Chamber of Deputies in 1877 had for its only programme opposition to the attempt of the 16th of May. When that reaction was swept away great divergencies showed themselves. They increased after the elections of August, 1880, to such an extent that the Republicans could no longer form a governing majority. The consequence was a rapid succession of ministries broken on the first caprice. The method by which representatives were chosen to the Chamber of Deputies was certainly an active cause of this governmental disorganization. The deputies, nominated individually by insignificant districts, represented each his arrondissement instead of being placed collectively, as formerly, on a departmental list. Local interests thus prevailed over general interests. The deputy took care above all to serve his little constituency with such fidelity that it was impossible for the Chamber to have a programme marked out on broad lines and to intrust this programme to its chosen ministers. These ministers became merely the clerks of the Chamber, as the deputies themselves were the docile servants of their arrondissements.

On the morrow of the brilliant triumph of the Republic in the elections of October, 1877, the influence of Gambetta was unlimited, especially after Marshal MacMahon had, in 1879, resigned the presidency of the Republic and had been succeeded by M. Jules Grévy. The latter confined himself to the strict discharge of his constitutional duties. The reality of power belonged without reserve to Gambetta, although as long as it was possible he refused to assume the official direction of affairs and remained content with the speakership of the Chamber. Convinced that the Chamber would furnish a real governmental majority and that principles would prevail over selfish interests only when its members should be elected by departmental ballot rather than by separate arrondissements, he resolved to insist upon this cardinal reform before assuming ministerial responsibility. For a moment, in the summer of 1880, he was on the point of obtaining it; he had prevailed over the repugnance of the Chamber, but the project failed in the Senate. When, in consequence of the general elections of August, 1880, he was obliged to accept the presidency of the Council, he made no effort to keep it. By proposing to a Chamber newly elected an electoral reform which should without fail send its members back forthwith to new electors, he exposed himself at once to certain defeat. The few weeks of his ministry furnish therefore no criterion of what he would have been as the premier of the state. But, though fallen from power, in him was still centred, as in its most incontestable representative, the strength of the Republican party, when, on the last day of 1882, the world was startled to hear of his assassination by a woman's hand.

His obsequies were without precedent. All France was there represented. She lamented and eulogized not merely the great orator, one of the chief founders of the Republic, but above all the man who had been her representative and champion in the bloody and direful days of the invasion. The heart of France beat strongly that day in the crowds which followed sadly the hearse of her most illustrious citizen. But, alas! at that service God was not invoked. It was entirely secular. It corresponded too well with the convictions of Gambetta himself, who had never distinguished between Christianity and Ultramontane Catholicism. His famous phrase, "Our enemy is clericalism," was the inspiration of his internal policy, unfortunately followed by many of his political friends with a sectarian narrowness which was foreign to his character. Gambetta may be reproached with having been too faithful to that system of centralization which has been preserved under all the governments of France. Nevertheless he was a man of progress, a true representative of democracy, rejecting the vain dreams of socialism, but earnest and persevering in pursuit of social reform. The heart of the people responded warmly to his own. A thoroughly proved patriot, an orator of matchless power, the loss of Gambetta left in the French Republic an immense void. No leader has been able to take his place, for he surpassed all the men of his generation in the greatness of his eloquence and the grandeur of his political views. (E. DE P.)

See Vol. X. p. 60 Am. ed. (p. 66 Edin. ed.).

GAMBLING, or GAMING. The art or practice of acquiring money or property by hazard or chance; an agreement between two or more to risk money upon a contingency, or chance of any kind, where one must be loser and the other gainer (5 Sneed, 507). "Whenever money or other valuable consideration is hazarded and may be lost, or more than the value obtained by chance, it is gaming, nor will any name or device take it out of this category" (State of Tenn. *vs.* Smith & Lane, 2 Yer. 272).

Early legislation in England against gaming seemed to be based on the ground that it interfered with the usefulness of servants, laborers, etc.: provoked idleness, and diverted attention from archery. The first statute (12 R. 2, c. 6) in England (1388), prohibiting gaming, applied only to servants of husbandry, artificers, and victuallers—not to servants of gentlemen—and commanded such to refrain from "hand and foot ball, coits, dice, throwing of stone kayles, and such other importune games." The next statute (11 H. 4, c. 4, 1409) enforced the above, with a penalty of six days' imprisonment for each offence. The next act (17 Ed. 4, c. 3, 1477), after naming in a preamble the foregoing games, says, "Contrary to such laws, the said games and divers newly devised games called cloish, kayles, half-bowle, hand-in-and-hand-out, and queckeborde, from day to day are used in divers parts of the land;" then provides that no occupier or master of a house shall voluntarily permit any prohibited person to play at any such game in said house under pain of three years' imprisonment and a forfeiture of £20 for each offence. No prohibited person could play under pain of two years' imprisonment and £10 default. Another act (11 H. 7, c. 2, 1494) provided that no artificer, laborer, or servant should play any unlawful game except at Christmas, while the law (19 H. 7, c. 12) of 1503 absolutely prohibited certain persons named therein from playing at any game. In 1511 (3 H. 8, c. 3) unlawful games were again prohibited, and a still more stringent law was enacted in 1535 (22 H. 8, c. 35).

In 1541 (33 H. 8, c. 25) the manufacturers and dealers in archery petitioned Parliament to prohibit all games and enforce the practice of archery. Accordingly, in 1542, a most stringent act was passed, obliging all able-bodied male citizens between the ages of 17 and 60 years, except ministers and judges, to own bows and arrows, and to practise with the same. Masters were required to see that their servants were provided with bows and arrows and instructed in their uses; if not provided, the master must furnish the same, and was empowered to deduct the price from the servant's wages. This act repeals all other laws concerning gaming, and then prohibits the keeping of any "common house, alley or place of bowlinge, coytinge, cloyshe, cayles, half-bowle, tennys, dysing table, or cardinge, or any other unlawfull new game hereafter to be invented," under a penalty of 40*s.* for each offence. Magistrates, sheriffs, bailiffs, constables, and head officers of cities, boroughs, and towns were required and authorized to enter all such places at any time and arrest offenders; they must also search at least once a month to discover such places and suppress the same under a monthly penalty of 40*s.* for every default.

Section 16 of this act then provides that "No manner of artificer, craftsman, husbandman, apprentice, laborer, servant at husbandry, journeyman, or servant of artificer, mariner, fisherman, waterman, or servingman shall play at the tables, tennis, dice, cards, bowles, clash, coyting, logating, or any other unlawful game, out of Christmas, under pain of 20*s.* for each offence." At Christmas this class could only play in their master's house or presence. This act made no game in itself unlawful. It only became unlawful by being used by certain persons at certain times or certain places. The keeping of a common gambling-house for any unlawful game, for lucre or gain, was prohibited; but no game was made unlawful unless played in such common house. Faro and rouge-et-noir were not then considered unlawful games.

In 1745 faro, bassett, ace of hearts, hazard, passage, roly-poly, roulette, and all games of dice, except backgammon, were prohibited under a penalty to setter-up of £200 and £50 fine for players. The act of 1848 repealed so much of the act of 1542 as prohibits bowling, tennis, and other games of mere skill.

Justices of the peace, at their annual licensing meetings, were empowered to grant a license to persons to keep a room for billiards, bagatelle-boards, and the like; but these were prohibited between the hours of 1 and 8 A. M., and on Sundays, Christmas, Good Friday, or any public fast or thanksgiving day.

Gambling was not indictable at common law.

In England, at common law, it was held, a common gambling-house, kept for lucre or gain, was *per se* a common nuisance, as it tends to draw together idle and evil-disposed persons, to corrupt their morals and ruin their fortunes; being the same reasons given in the case of houses of common prostitution (King *vs.* Rogers & Humphreys).

New South Wales, in 1850, passed most stringent laws against gaming, naming "billiards, bagatelle, bowles, fives-racket, quoits, skittles, or nine-pins," in addition to banking games. Constables were authorized to enter all suspected places, to arrest all persons keeping any gambling paraphernalia, cards, dice, etc., making the possession of such matters evidence of the house being a common gaming-house, thus throwing the burden of proof upon the occupant. All contracts were void.

In the United States the keeping of a common gambling-house is indictable at common law on account of its evil influence on public morals (1 Bish. Crim. Law, 504; 1 Rus. 3 Eng. Ed. 325; U. S. *vs.* Dixon, 4 Cranch C. C. 107; State *vs.* Savannah, T. W. P. Charl. 235; State *vs.* Doon, R. M. Charl. I.)

Gambling has also been almost universally legislated against in the various States and Territories because it contravenes public policy, is destructive of public morals, and creates and fosters other crimes. In Georgia, in 1764, a general act was passed against gambling, yet in 1811, under common law, it was held that "A house where a faro-table is kept for common gambling is *per se* a nuisance, notwithstanding they were subject to taxation by law" (R. M. Charl. I.) In Tennessee, 1785, a tax of £250 was imposed upon every A. B. C. or E. O. table. In 1799 all gaming was prohibited, and all contracts and security in consideration of gaming declared void. No person could institute suit to recover money lost under a penalty. Under the laws of 1817 judges of errors and appeals could debar any practising attorney guilty of violating the law against gaming, while any person convicted of gaming was disqualified to hold any office of trust in the State for five years. In West Virginia the law especially names "faro, keno, wheel of fortune, roly-poly, hop-hazard, alias blink-hazard, alias snick-up, alias sweat, pool, dice, cards, A. B. C. and E. O. tables." New York State, by its penal code, prohibits the occupying, keeping, using, or allowing to be used, any room, tenement, booth, or building, or part thereof, table, device, or apparatus for gambling purposes. It is made the duty of all sheriffs, policemen, constables, district-attorneys, and prosecuting officers to inform against and prosecute all persons whom they have reason to believe guilty of violating these laws. All persons are authorized to arrest, and also empowered and required to seize all articles suitable for gambling purposes, and to bring the same before the magistrate.

The effects of gambling are most vividly described by that eminent jurist, Judge Catron, formerly of the Supreme Court of the United States, in a decision rendered by him. He says:

"Like other passions which agitate the great mass of the community it lies dormant until once aroused, and then, with the contagion and fury of a pestilence, it sweeps morals, motives of honest pursuits and industry into the vortex of vice; unhinges the principles of religion and common honesty; the mind becomes ungovernable, and is destroyed to all useful purposes; chances of successful gambling alone are looked to for prosperity in life, even for the daily means of sustenance; trembling anxiety for success in lotteries, at the faro-bank, or loo-table, exclude all other thoughts" (2 Yer., Tenn., 272).

Notwithstanding stringent State laws and the common law, to the contrary, until 1880, gambling was almost universal throughout the Union—the punishment of gamblers being an exception instead of the rule. Prior to 1880 embezzlements, defalcations, robberies, thefts, breaches of trust, and other crimes were constantly announced by the public press as the direct result of gambling. The gambler's victim, if convicted, received severe penalties, while the gambler could scarcely be brought to justice at all, and if convicted escaped with a nominal fine. It was estimated that the income of these gaming-houses in New York city, including nine lotteries, was upwards of $10,000,000 per year. The principal gamblers ranked high as politicians, and were sought for by the leaders of both political parties, because of the large contributions or assessments they were willing to pay. In return for these assessments they demanded that their business should not be molested. For years it was not, either by police, prosecuting attorneys, or the courts.

In 1877 the New York Society for the Suppression of Vice began a vigorous attack upon these evils. Scores of gamblers were arrested and indicted, their places raided, and their gambling paraphernalia seized. These cases, until the fall of 1880, could not be brought to trial. Gamblers complained that they had paid for protection, and that they were not protected, but were raided and arrested by the agents of the society aforesaid. In August, 1880, Gov. Alonzo P. Cornell issued his proclamation to prosecuting officers, police, and the courts, calling upon them to enforce these laws. So indifferent were the courts, and so powerful the influence of the gambling fraternity, that, in the General Sessions Court, of New York city, 29 gamblers, convicted October, 1880, were sentenced to a total of but $202.50, or less than $7 each. Long and bitter was the conflict. Another society (Society for the Prevention of Crime) bravely seconded the efforts being made. Public sentiment was aroused, and despite all opposition, by the firm, persistent, and relentless efforts of these societies, in 1881–84 scores of these criminals were convicted and sentenced to imprisonment, while thousands of dollars worth of paraphernalia seized was destroyed. In 1885 scarcely a place in New York city was found open to the public, or where a stranger could enter or play, unless vouched for by some one in whom the boss-gambler had confidence. Laws triumphed not only in New York, but her example has been infectious, and in 1885 nearly all the principal cities in the Union waged a bitter warfare against gambling. In Louisville, Ky., long the head-quarters of notorious lotteries, in November and December, 1885, 35 gamblers were convicted and sentenced to a total of 47 months' imprisonment and $16,000 fine—the severest penalties inflicted in any State in the Union upon the same number of gamblers.

The principal games in the United States are faro, poker or roulette, rouge-et-noir, sweat, hazard, baccarat, vantune, monte, three-card-monte, honest-man or twenty-one, odd-and-even, fin-tan or Chinese faro, pool, horse pool, lottery, and policy—the two last most prevalent (See LOTTERY).

Faro is a bet on cards. A layout of green baize cloth has upon it what represents a full deck of cards, arranged about the border, each of the four kinds being grouped together. There are chips or counters of various colors used, each color representing value—white 25 cents, red 50 cents, blue $1, etc., which are sold in stacks of 10 or 20 each to the players. An ordinary whist pack is placed in a metal deal box, which has a spring to keep the cards pressed up to the top. The dealer deals one card at a time from the top of the pack by sliding it out through a slit in one side of the top. The bet is, that a certain card will come out among seven to be dealt. The player places his chips to the amount of his bet upon a certain card. The dealer bets upon the card opposite, on the board. If the card the player has bet upon comes out he wins; if not then at the seventh card dealt the dealer sweeps the board. In an honest game the odds are 85 to 15 in favor of the dealer. With marked or stacked cards the odds are all in favor of the dealer.

Rouge-et-noir is similar to faro: the player bets by placing his chips on a red or black card; if his color is next dealt he wins, if opposite color he loses.

Monte, sweat, honest-man, and twenty-one are all similar games with cards. The dealer deals a card to each player; and one opposite each for himself. The player bets that a certain card will come out first. If it does he wins; if the card opposite to him comes out first he loses.

In odd-and-even the bet is on the card next dealt, to be either an odd number or an even one.

Poker, or bluff, is played with cards. Five cards are dealt each player; the one holding the highest cards wins the bank or pot. Each player bets upon his own hand as against the others. Poker is usually played by not more than four players.

A sweat layout consists of a cloth or board with the numbers "1 2 3 4 5 6" upon it, and is played usually with one and sometimes two dice. The player bets his chips upon a certain number, say on 4, and if 4 appears on the dice he wins; if not he loses.

Three-card-monte is a disreputable trick with three cards, usually employed by sharpers at country fairs, on railroad trains and steamboats, to rob the unwary. The dealer manipulates the cards, after first showing the face of each, throws them down, face downward, and the dupes bet upon the denomination of a certain card.

It must be observed that players exchange their money for chips, then bet their chips against their own money, voluntarily placed by them in the dealer's hand. The dealer manipulates the contingency (cards) upon which the wager depends, with the odds always largely in his favor. Adroitness, cunning, experience at manipulating cards, sleight-of-hand, skill, and practice in trickery, robbery by trick and device, a keen knowledge of human nature, and the weakness of mankind when aroused by greed, contend against ignorance, folly, blinded hopes, clouded judgment, and often distress, desperation, and a brain fired and unbalanced by the wine-cup. (A. C.)

GAMMELL, WILLIAM, an American educator and author, was born at Medfield, Mass., Feb. 10, 1812. He graduated at Brown University in 1831, and was made tutor there. In 1835 he became assistant professor, and in 1836 professor of rhetoric and English literature. In 1850 he was transferred to the chair of history and political economy, and resigned this position in 1864. In 1870 he was made one of the fellows of the corporation. Besides many contributions to reviews and magazines, he has published *Life of Roger Williams* and *Life of Gov. Samuel Ward* in Sparks' *American Biography*, and a *History of American Baptist Missions* (1850).

GANNETT, EZRA STILES (1801–1871), an American Unitarian minister, was born at Cambridge, Mass., May 4, 1801. He was educated at Phillips Academy, Andover, and graduated at Harvard College in 1820. He then studied theology, and in June, 1824, was ordained as colleague to Rev. W. E. Channing, in Boston. Upon Dr. Channing's death in 1842, he became sole pastor and so remained till his death, though he spent two years in Europe on account of his health. He published several sermons, and from 1844 to 1849 was joint editor of the *Christian Examiner*. He was prominent in various benevolent and philanthropic enterprises. He died by a railroad accident near Boston, Aug. 28, 1871.

GARDEN, ALEXANDER (1728–1791), a British naturalist, was born in Scotland in 1728. He graduated at Aberdeen University in 1748, studied medicine and settled at Charleston, S. C., in 1752. On account of his labors in botany and zoölogy he was, in 1773, made a member of the Royal Society, of which he afterwards was vice-president. He was a correspondent of Linnæus, who named the beautiful shrub *Gardenia* in his honor. Being a loyalist, Dr. Garden went to England in 1783, and his property was confiscated, but afterwards was restored to his son. He died at London, April 15, 1791.

GARDEN, ALEXANDER (1757–1829), an American soldier and author, son of the preceding, was born at Charleston, S. C., Dec. 4, 1757. He was educated in England and graduated at Glasgow in 1777. When he returned to South Carolina, he joined the patriot army and served in Henry Lee's light-horse legion. In his later years he wrote *Anecdotes of the Revolutionary War* (1822–28; republished, Brooklyn, 2 vols., 1863), which is highly esteemed as an authority for the period. He died at Charleston, S. C., Feb. 29, 1829.

GARDENIA, or CAPE JASMINE. There are numerous species, but those especially thus designated are natives of China and are known in gardening as *Gardenia florida* and *Gardenia radicans*, with some varieties between the two, if, indeed, both of the nominal species be not themselves varieties of one thing. The *Gardenia* belongs to the order *Rubiaceæ*, and to that section of it regarded by Lindley and some other botanists as constituting a distinct order, the name *Cinchonaceæ*, to which the coffee, cinchona, and other tropical plants belong. Beyond the fact that the Chinese are said to prepare from the flowers and fruit an orange or light scarlet dye for silk, the Gardenias have place in none of the arts except that of gardening. The delightful odor of the large waxy-white flowers rendered it a popular favorite on its introduction to England about the year 1754; it fell into the hands of James Gordon, a nurseryman, who from four cuttings in a few years raised and sold plants to the value of $25,000. One of these was sent by Mr. Ellis to Dr. Alexander Garden (*q. v.*), in whose honor he had named it. From this probably all the American plants spring. It is hardy in the United States wherever the temperature does not go far below the freezing-point in winter, and hence it is one of the most popular plants for out-door gardening in the Southern States. In the North it is a favorite pot-plant, and the flowers in early spring are very much esteemed in florists' work.

The early history of the plant furnishes some of the most fascinating gossip in Smith's *Correspondence of Linnæus*. An East India ship, the Godolphin, Capt. Hutchinson, put in at the Cape of Good Hope. The captain, on shore, was attracted by a sweet odor, and on searching for the source found a small plant in bloom which he put into a tub of earth and carried successfully to England, where it was placed under the care of Mr. Warner. The Dutch were famous florists and had a botanical garden at the Cape. They had exclusive intercourse with China. The plant had been introduced in some way from Asia. But being supposed at that time to belong to the jasmine family, the name "Cape Jasmine" was given to this Chinese plant. After Linnæus' attention had been called to it by Ellis, he found that he had already a dried specimen in his collection which had been received from the East Indies. Ellis had intended to name the plant *Warneria*, but as Miller had so named a ranunculaceous plant (now found to be identical with *Hydrastis*) he gave the name in honor of his friend and correspondent Dr. Garden; but not however without a gentle protest from Linnæus against such honor where the person honored had no connection with the history of the plant. It is used for evergreen hedges in Japan, where it is known as "Kits ginas." In the East Indies it is called "Cotsjopiri." (T. M.)

GARDINER, JOHN (1731–1793), an American lawyer, was born at Boston, Mass., in 1731. He studied law in London, was admitted to the bar in Westminster, and was one of the counsel for John Wilkes in 1764. He was attorney-general in the Island of St. Christopher from 1766, but after the American Revolution returned to Boston, and soon settled at Pownalborough, Me., which he represented in the Massachusetts legislature until his death. Noted for wit and eloquence, he was one of the leaders of the Unitarian movement in 1787. In the legislature he procured the abolition of primogeniture, and the repeal of the laws against theatres. He was drowned off Cape Ann, Oct. 15, 1793.

GARDINER, JOHN SYLVESTER JOHN, D. D. (1765–1830), an American clergyman, son of the preceding, was born at Haverford West, Wales, in June, 1765. He was taken by his father to the West Indies, was educated in Boston and by Dr. Samuel Parr in England. He returned to America in 1787, and being ordained deacon by Bishop Provoost in New York, had charge of the parish of St. Helena, S. C., until 1791, when he was ordained priest. He became assistant minister of Trinity Church, Boston, in 1792, and rector of the same in 1805. He also conducted a classical school and was a contributor to literary periodicals. He died at Harrowgate, England, July 29, 1830.

GARDINER, SYLVESTER (1707–1786), an American physician, born at Kingston, R. I., in 1707, studied medicine in London and Paris, but settled at Boston as physician and drug-merchant. On his lands in Maine he established Pittston and Gardiner. Being a loyalist he left Boston with the British troops in 1776, and went to England, but returned to America in 1785, and died at Newport, R. I., Aug. 8, 1786. He was one of the founders of King's Chapel in Boston, and prepared a prayer-book. Much of his property which was confiscated was afterwards restored to his heirs.

GARFIELD, JAMES ABRAM, twentieth President of the United States, son of Abram and Eliza Garfield, was born in Orange township, Cuyahoga co., Ohio, Nov. 19, 1831. Of his paternal Puritan ancestry, Hon. George F. Hoar says: "Of the seven generations born in America, including the President, not one was born in other than a frontiersman's dwelling. Two of them, father and son, came over with Winthrop in 1630. Each of the six generations who dwelt in Massachusetts has left an honorable record, still preserved. Five in succession bore an honorable military title. Seven were fighters in the Indian wars. At the breaking out of the Revolution the male representatives of the family were two young brothers; one, whose name descended to the President, was in arms at Concord Bridge, at sunrise on April 19, 1775; the other, the President's great-grandfather, dwelling thirty miles off, was on his way to the scene of action before noon." Abram Garfield, father of the President, was born in Otsego co., N. Y., in December, 1799. Two years later his father died. He grew up under the rigid but wholesome discipline of poverty and toil to great physical strength, and formed a good character for industry, courage, persistence, and strong moral and religious principles. His removal in early manhood to Ohio, his marriage with Miss Eliza Ballou, and the planting of their home in the forests of Northern Ohio, bring us to the birthplace of their son, James Abram. Judge Hoar has truly said: "The history of the settlement of Massachusetts, Central New York, and Ohio, is the history of the Garfield race." The hardy virtues of pioneers were theirs. They were patriotic, persevering, heroic, just, and generous; ardent in their devotion to the interests of civil and religious liberty; distinguished for muscular strength, pure morals, and profound religious faith.

Eliza Ballou, daughter of James and Mehitabel Ballou, was born in Richmond, Cheshire co., N. H., Sept. 21, 1801. Maturin Ballou was a Huguenot, who fled from France after the revocation of the edict of Nantes, to a home of freedom in Rhode Island. His descendants in this country were noted for brilliancy of intellect, liberal culture, moral excellence, religious zeal, and superior oratorical power. Several of them were preachers—the most noted of these being the Rev. Hosea Ballou, the founder of the Universalist Church in the United States. Eliza Ballou was his grandniece. From such an ancestry, it may be readily judged what a favorable combination of physical, intellectual, and moral qualities—of brawn and brain and heart—entered into the heritage of James A. Garfield.

In Garfield's child-life there was little that can be called remarkable. He is reported by a friend to have said, after reaching manhood, that his highest ambition, until he was about sixteen years old, was to be captain of a vessel on Lake Erie—certainly a modest ambition compared with the usual dreams and ambitions of childhood and youth. He was the youngest of four children—Mehitabel, Thomas, Mary, and James Abram. Before he was two years old his father died, leaving this family in the log-cabin, with some twenty acres cleared around it, a rude log-barn, a young orchard, and a few farming implements. There were a few straggling debts, but not enough to burden seriously this small inheritance. By dauntless energy and rigid economy the widow succeeded in paying off the debts, in securing a portion of the land for a home, selling twenty of the fifty acres, and in winning a comfortable support for her children. Her immediate neighbors were New Englanders, intelligent, energetic, sociable, and religious. The surroundings of the family were as favorable as those of most pioneer families of New England origin, unblessed with wealth, but combining a good degree of intelligence and strong religious faith with simple tastes, great physical energy, and the sturdy virtues apt to be developed amid the rude scenes and numerous hardships of frontier life. Mrs. Garfield inherited the fine, compact, nervous organization of the Ballous, together with their intellectual tastes and religious fervor. She had been a school-teacher. Although her rude, humble log-cabin held but few books, the Bible being the chief book for the study of the household, her mind was stored with a rich variety of New England lore—with history, tradition, story, and song—and while Bible-reading and prayer were daily exercises in the family her children were also instructed in such knowledge as she possessed, and entertained with the stories and songs with which her memory was enriched. The school-house also was within reach, for instruction in such rudiments as were then taught in the schools of a new country. With such environments the child, James, grew into boyhood, in a pleasant home, with a few agreeable associates from neighboring homes. He inherited a strong, healthy physical constitution. He early learned to read, and, besides the Bible, such books as were within his reach—the old *English Reader*, *Life of Napoleon* and of *Marion*, *Tales of the Sea*, *Plutarch's Lives*, etc., were eagerly devoured. At school he was always forward with his lessons, sometimes puzzling even his teachers by a mastery of his studies beyond their own attainments. Always physically active even to restlessness, manual labor and manly sports were both pleasures to him. Whether toiling on the farm, or chopping cord-wood by the job, or driving horses on the tow-path of the Pennsylvania and Ohio Canal, or working at the carpenter's bench—for, among the rest of his youthful attainments, he had learned how to build houses—he was always diligent and faithful, and uniformly won the respect of his employers. Many a hard-earned dollar was, by such toils, secured for the purchase of books, or to help his mother in the support of the family.

In his sixteenth year a passion for a seafaring life took strong possession of him. This desire had probably been kindled by some of the books he had read, and nurtured by an occasional glimpse of Lake Erie in the distance, dotted with white sails filled with the breeze, and joyously wafting vessels over the blue waters. Gaining his mother's reluctant consent, he went to Cleveland to ship as a sailor on some one of the vessels in port. This was his first serious venture away from home. Disappointed in his applications for service as a sailor, and failing in all his efforts to obtain employment in the city, he hired out to the captain of a canal-boat—one Amos Letcher, a cousin of his—to drive horses on the tow-path. After meeting with various adventures in which were developed great pluck and endurance, it became apparent to him and also to his employer that he was born to higher tasks than this, and he returned to his home preparatory to a search for some worthier employment. After a serious illness of several months, he arose from his sick-bed with a resolution to obtain an education. In his eighteenth year, after perfecting himself in the rudiments taught in the common schools, he entered Geauga Seminary, an academy in Chester, Geauga co., Ohio, under the direction of the Free-Will Baptists. Here he continued his studies between two and three years, with intervals spent in working at his trade as a carpenter and in teaching. Natural philosophy, botany, English grammar, algebra, Latin, and Greek, were the studies pursued at Chester. His studies here occupied four terms, and he taught district-school, at intervals, two terms. In the autumn of 1851 he entered the Western Reserve Eclectic Institute—now Hiram College—at Hiram, Portage co., Ohio, an institution under the direction of the DISCIPLES OF CHRIST (see Vol. II., p. 656). Here he pursued his studies until 1854. He was, on his own application, made janitor, that he might earn part of the money needed to pay his way by kindling the fires, sweeping the floors, and ringing the bell. He soon became a general favorite, and his progress in his stuides was such that, ere long, he was employed as tutor during the illness of one of the teachers of science and English literature. He had already taught in district-schools three or four terms, and he now began to develop a peculiar power to impart as well as to receive instruction; so that from this time onward he was constantly employed in teaching from three to six classes a day, as long as he remained at Hiram.

On March 4, 1850, young Garfield was baptized, near his home in Orange, by Evangelist W. A. Lillie, and a week later was received into the church in Orange to which his mother belonged, as had also his father. He had been familiar from childhood with the faith and practice of the Disciples; but he acted, in this matter, on his own conviction of duty, and not until theological difficulties that had arisen in his mind were frankly stated and satisfactorily explained did he make a public confession of his faith. He at once became an earnest worker in the church, frequently speaking in the prayer-meetings, and developing into such force and attractiveness of speech that within a few years the churches in that region were glad to receive visits from him and listen to his discourses. He drew large audiences wherever he went, and it is not unlikely that, for a time, he cherished the idea of devoting his life to the Christian ministry. This, however, was never fully determined, and although he continued for several years to preach with great acceptance whenever his regular employments allowed of it, and, indeed, through all his life was ready to manifest his faith and his interest in spiritual things, by public addresses on suitable occasions, he finally decided that his vocation was in another sphere of life. But this change of pursuit carried with it no change of faith or of fellowship. His ecclesiastical affiliations were never broken; his faith in Christ remained with him, through all changes, to the last.

In the fall of 1854 Mr. Garfield entered Williams College, at Williamstown, Mass., then under the presiding care of the eminent Mark Hopkins, D. D., LL. D., to whom he ever after acknowledged great indebtedness for his intellectual and moral growth. Graduating in 1856 he took one of the highest honors of his class. He had obtained a high reputation for thoroughness in study, purity of life, and manly devotion to truth for truth's sake, and won all hearts by his genial spirit and upright ways.

Returning to Hiram, he was elected teacher of ancient languages in the Eclectic Institute. Two years later he became principal. Under his management the institute was eminently prosperous. An enthusiasm for study was kindled among the students, such as is rarely witnessed. His morning lectures—in which not only his book-knowledge but the large store of facts which his quick perceptions and ceaseless inquiry had gathered up from every-day scenes was brought into requisition—were a great inspiration as well as a great source of information to the students. The throng of pupils was held in perfect order by his personal influence.

But the discharge of his duties as principal of the institute was a small part of his work. He kept up a large course of reading and study outside of that which related to educational matters; he delivered lectures and addresses on various subjects; he participated in public debates on questions theological and scientific; he preached almost every Sunday; he engaged in the study of law, and was admitted to the bar by the Supreme Court at Columbus, Ohio: and with all this work on his hands he found time to enter the political arena and make speeches for the Republican party. Nor did all these employments shut him out from the duties and enjoyments of social life. He was cheerful, and even jovial, with his friends, personally familiar with all his pupils, and readily accessible to all that called on him. His position as principal of the Eclectic Institute was held until August, 1861, when he went to the army; though his name was retained in later catalogues, in the hope that he would return to the post from which his patriotism had called him. In the catalogues of 1865 and 1866 his name appears as advisory principal and lecturer, and after that on the list of trustees.

He was married to Miss Lucretia Rudolph, daughter of Zeb and Arabella Rudolph, Nov. 11, 1858. He first met her at the Geauga Seminary, where they were both students. Subsequently, at Hiram, where Miss Rudolph was one of the first students, she recited in several of the classes taught by Mr. Garfield. An acquaintance thus formed ripened into mutual affection and resulted in their marriage. Miss Rudolph was as remarkable for diligence and success in her studies as for her evenness of disposition, quiet manners, and dignity of character.

To James A. and Lucretia Garfield were born seven children—five sons and two daughters—of whom five are now living. It is due to Mrs. Garfield to say that, having known her husband from the first of his struggles to obtain an education, and having passed with him through several years of student-life, she did not fail, after their marriage, to keep pace with him in intellectual pursuits, or to sympathize with him in the labors and anxieties of his public life. Their home was not only an abode of domestic happiness and social enjoyment but also of refined culture—a centre of attraction to cultivated minds. The neatness and order that ever quietly reigned; the free play of domestic affections; the delightful sympathy between husband and wife in all that pertained to literary and scientific culture; the education of bright, healthy children into sympathy with their parents in intellectual pursuits; and the free, joyous outflow of all this home feeling and sentiment into the social circles that gathered at their fireside, make up a beautiful picture of home-life.

The year of Mr. Garfield's graduation from Williams College (1856) was the year of the first national convention of the Republican party, to nominate candidates for the Presidency and Vice-Presidency. For John C. Fremont, its nominee, Mr. Garfield cast his first vote. From that time until his death he was a steadfast adherent of that party, and rapidly made his way to the front rank of its champions. Constitutionally and educationally, by inheritance and by all his early surroundings, he was the devoted friend of civil and religious liberty, and the determined foe of slavery in all its forms. From the time that the Republican party flung its banner to the breeze, with the inscription, "Resistance to the Spread of Slavery in the National Territories," through all the political conflicts and bloody strifes which ended in the overthrow of slavery in the United States, and thence on through the exciting period of reconstruction unto the consummation of all the measures proposed by the dominant party for the national welfare, Mr. Garfield was the unswerving advocate of Liberty and Union, and, for the most part, a prominent figure in that thrilling period of the history of the government of the United States from 1860 to 1880. We note briefly the steps in his political and military career.

In 1859, in his twenty-eighth year, he was elected to the Ohio Senate from the Summit-Portage district. Although the youngest member of that body, he took a front rank among the State senators, and, along with J. D. Cox and James Monroe, rendered essential service in preparing Ohio for the approaching contest with the forces of the rebellion. These gentlemen were known as "The Radical Triumvirate," whose advanced sentiments, vigilance, and arduous efforts were largely instrumental in preparing the Ohio legislature for a prompt response to Pres. Lincoln's call for 75,000 men—voting in several bills, at different dates, 20,000 men and $3,000,000 for the defence and maintenance of the Union.

Aug. 14, 1861, Mr. Garfield received from Gov. Denison his commission as Lieut.-Col. of the Forty-second regiment Ohio volunteer infantry, and on the 16th of the same month he was mustered into the service at Camp Chase, near Columbus, Ohio. For four months his time was spent in learning and in teaching the art of war, and in the recruiting service.

Dec. 15, 1861, he was ordered to report for duty to Gen. D. C. Buell, at Louisville, Ky.; and before he had gained the least experience on the battle-field he was placed in command of four regiments of infantry and some eight companies of cavalry, and charged with the duty of driving the forces under Gen. Humphrey Marshall out of Kentucky—forces, as it afterwards appeared, amounting to 4400 infantry and 600 cavalry. On Jan. 10, 1862, the battle of Middle Creek was fought, and Marshall's forces were defeated and driven out of the State. The defeat of Gen. Marshall was followed by the defeat of Zollicoffer's army, at Mill Spring, by Gen. Thomas, Jan. 19. Gen. Zollicoffer was slain, and what remained of his army was chased into Tennessee, as Gen. Marshall's forces had previously been driven into Virginia. These victories were the dawn of a brighter day for the Union. Pres. Lincoln commissioned Col. Garfield a brigadier-general of volunteers, dating his commission Jan. 10, the date of his victory at Middle Creek. He was the youngest general in the army—two months over thirty years of age.

After this, he took part in the battle of Shiloh, under Gen. Buell. Without entering into the details of his military history, it is sufficient to say that his services for some time after the battle of Shiloh were mainly rendered in courts-martial, where his legal knowledge and skill, sound judgment, and strict impartiality were found of great value. The most important and celebrated of these trials was that of Fitz-John Porter, in 1862–3, to bear a part in which Gen. Garfield was ordered to report at Washington City. The trial lasted nearly two months, and involved some complicated questions. The result of the trial was a verdict of guilty. In this verdict, after the most thorough investigation, Garfield heartily joined. Although, since his death, Gen. Grant and others changed their first opinion, and in view of new information declared Gen. Porter justified, it should be recorded here that no subsequent developments made during his lifetime in the least changed Gen. Garfield's conviction as to the righteousness of the verdict.

Disabled for a time by sickness, on his recovery he was made chief of Gen. Rosecrans's staff, succeeding the lamented Col. J. P. Garesché, who was killed in the battle of Stone River. In this important position his services were soon found to be of the highest value. It is sufficient to refer to the language of Gen. Rosecrans in his official report of operations in Middle Tennessee: "All my staff merited my warm approbation for ability and devotion to duty; but I am sure they will not consider it invidious if I especially mention Brig.-Gen. Garfield, ever active, prudent, and sagacious. I feel much indebted to him for both counsel and assistance in the administration of this army. He possesses the energy and instinct of a great commander."

In the battle of Chickamauga, so stubbornly contested, whatever may have been its blunders and disasters, there is no question as to the skill and bravery with which Gen. Garfield performed his difficult duties as chief of staff—skill in the orders he issued directing the movements of the army; heroism in his perilous ride across the battle-field in a terrible crisis, to reach Gen. Thomas, to furnish him with the information he needed to wrest victory from the hand of the enemy, and save the gallant Army of the Cumberland from overwhelming defeat. The official recognition of his meritorious services by Gen. Rosecrans, and the speedy promotion of the brigadier-general to a major-generalship for gallant and meritorious services in this great battle, were but echoes of the general sentiment, among soldiers and civilians, as to the honorable part performed in that terrible conflict by this wise and brave soldier.

In the fall of 1862 Gen. Garfield had been elected to Congress as a representative of the Nineteenth district of Ohio—a district made famous by its enthusiastic support of Joshua R. Giddings in his radical anti-slavery advocacy. The election of Gen. Garfield took place in his absence, and was a spontaneous tribute to his worth by the people of his district. As the seat to which he was elected was not to be occupied until December, 1863, he refrained from a final decision as to his future course until the fortunes of the war should be more fully disclosed. Now, however, the time had arrived when a decision must be made; and after much consultation with distinguished army officers, and with the authorities at Washington, including Pres. Lincoln, he decided to bid adieu to army life in obedience to the urgent demand for his services in the national legislature. From this time forward he gave himself to statesmanship, and for a period of seventeen years his name is identified with all the great measures of the Republican party, in carrying the war to a triumphant issue, in reconstructing the conquered seceding States, in conforming the Constitution and laws of the nation to the new condition of things, and in guarding the country from financial embarrassment and guiding it in the highway of national prosperity. Now in his thirty-third year, possessed already of considerable experience in civil and military affairs, having the advantages of a liberal education and a wide range of reading and study, with well-balanced powers, a robust physical manhood, a peculiar genius for work, oratorical powers of more than ordinary attractiveness and effectiveness, and fixed political, moral, and religious principles, he was eminently fitted for success in the legislative career that opened to him in the most interesting and perilous period of the history of the national government. Whether in committees, originating legislative measures, or on the floor in the House of Representatives advocating and defending these measures, his industry, his encyclopedic knowledge, his comprehensive grasp of the gravest and most difficult subjects, his keen insight, his conservatism, and his enthusiasm in behalf of political justice and constitutional freedom, combined to lift him at once out of the sphere of the mere party politician into that of the Christian statesman. He succeeded from the start in winning that public admiration and confidence which continued to increase throughout his congressional career, and culminated in his election to the Presidency of the United States.

Of his career in Congress Hon. James G. Blaine, in his "Eulogy on James Abram Garfield" before Congress, Feb. 27, 1882, says with just discrimination:

"Those unfamiliar with Garfield's industry, and ignorant of the details of his work, may in some degree measure them by the annals of Congress. No one of the generation of public men to which he belonged has contributed so much that will be valuable for future reference. The speeches are numerous, many of them brilliant, all of them well studied, carefully phrased, and exhaustive of the subject under consideration. Collected from the scattered pages of ninety royal octavo volumes of Congressional Records, they would present an invaluable compendium of the political history of the most important era through which the national government has ever passed. When the history of this period shall be impartially written—when war legislation, measures of reconstruction, protection of human rights, amendments to the Constitution, maintenance of public credit, steps towards specie resumption, true theories of revenue, may be reviewed unsurrounded by prejudice and disconnected from partisanism—the speeches of Garfield will be estimated at their true value, and will be found to comprise a vast magazine of fact and argument, of clear analysis and sound conclusion. Indeed, if no other authority were accessible, his speeches in the House of Representatives from December, 1863, to June, 1880, would give a well-connected history and complete defence of the important legislation of the seventeen eventful years that constitute his parliamentary life. Far beyond that his speeches would be found to forecast many great measures yet to be completed—measures which he knew were beyond the public opinion of the hour, but which he confidently believed would secure popular approval within the period of his own lifetime, and by the aid of his own efforts."

Were we called on to specify any one among the numerous difficult and perplexing subjects discussed by Gen. Garfield in Congress as that in which he showed peculiar mastery, and in handling which he rendered the highest service to his country, we should select that of Finance. As he said in his speech on "Currency and the Public Faith," delivered in the House of Representatives, April 9, 1874: "Next to the great achievements of the nation in putting down the rebellion, destroying its cause, and reuniting the republic on the principle of liberty and equal rights to all, is the task of paying the fabulous expenses of the war, the funding of the debt, the maintenance of public credit, and the launching of the nation on its career of prosperity." He studied financial questions most thoroughly. A reference to his congressional speeches will show with what signal ability and courage he fought against inflation in all forms, and for the maintenance of the public credit, at a time when the popular infatuation for inflation seemed irresistible, and threatened to overwhelm in political ruin any who attempted to resist it. Not only in Congress, but out of Congress, in public speeches, and in essays published in leading periodicals, he sought to educate the public in those views of revenue, public credit, resumption of specie payments, etc., to the adoption of which, after his masterly and unanswerable vindication of them, we are largely indebted for the subsequent national prosperity.

Besides his congressional speeches there were numerous addresses—memorial, historical, educational, and religious; campaign speeches, running through fourteen years, and sometimes numbering sixty or seventy in a single campaign; various legal arguments in important cases; contributions to encyclopædias and literary periodicals; and his speeches after his nomination to the Presidency, during his trip to and from New York city, remarkable for their number, brevity, and variety.

It is proper to add that as an orator, whether in legislative halls, in the pulpit, on the platform, or on the stump, he was always dignified, argumentative, and didactic. Although justly regarded as one of the most effective campaign orators in the country he despised the tricks of buffoonery and demogogy by which political crowds are often captivated. Refraining from personal and party rancor, never descending to vulgarity, he stood forth rather as a grave and earnest teacher of the public on great public questions. His art was to make plain to the common mind the subject under discussion. He wasted no time in exposing the weak points of an adversary; but, seizing his strongest points, took delight in presenting them in all their strength, that in demolishing them he might put an end to the controversy. His propositions were always clearly stated and logically sustained, and his vast stores of legal, historical, and classic lore furnished him with apt and felicitous allusions and illustrations. On a broad basis of fact and argument he based appeals to the patriotism, justice, and philanthropy of his auditors, in which his eloquence rang out with captivating power. He left his hearers on a higher plane of thought and sentiment than he had found them.

Although prevented by his congressional duties from devoting himself, as he had intended, to the legal profession, he had, in all, about thirty cases in the U. S. courts. It is worthy of note that he made his first appearance as a lawyer before the Supreme Court of the United States. Several of the cases in which he was engaged involved questions of great intricacy and perplexity. His mastery of these questions, and the clearness and strength of his legal arguments, leave no room for doubt as to the eminence he might have reached as a jurist had he devoted himself fully to his favorite profession.

In 1877, after Hon. J. G. Blaine had gone from the House of Representatives to the Senate, Gen. Garfield was left in sole possession of that leadership of the Republican party in the House the honors of which he had previously shared with Mr. Blaine; and this responsible position he continued to occupy as long as he remained in Congress. Though, in a few instances, bitterly assailed with charges affecting his integrity—especially in the years 1872–74—these charges were so manfully met and so entirely disproved that they did not seriously cloud his reputation. As the facts came to be known his character for truthfulness and honesty grew constantly brighter to the public view. Perhaps the best evidence of this is found in the fact that the people of his congressional district stood faithfully by him. He was elected nine times successively to Congress as representative of the Nineteenth district of Ohio. Another evidence is found in the fact that in 1880, without solicitation on his part, he was the unanimous choice of his party in the Ohio legislature for U. S. Senator, and the Democratic minority cordially joined to make his election unanimous. One of his biographers (Major J. M. Bundy) well says: "By this unprecedented vote the State of Ohio, which knew Garfield from the beginning, and had sifted all the slanders that malice and ignorance have combined to invent and keep alive, has cast her broad and protecting mantle over the greatest of her sons."

Before he had resigned his seat in the House of Representatives, or had taken his place in the U. S. Senate, he was, on the 8th of June, 1880, nominated by the National Republican Convention, at Chicago, as the Republican candidate for President of the United States. His election to the Presidency the following November made him, in quick succession, representative in Congress of the Nineteenth Ohio district, U. S. Senator-elect from the State of Ohio, and President-elect of the United States; all these honors unsought and unbought—the spontaneous gifts of the district, the State, and the nation; voluntary tributes to the worth of the man, the patriot, the soldier, and the statesman.

It is proper to say here that Gen. Garfield not only had no aspirations to the Presidency, but that the nomination was forced on him in the face of his most earnest protestations. It is well known to some, at least, of his confidential friends, that the position of U. S. Senator filled, at this time, the measure of his ambition. He regarded himself as best fitted for that place by all his previous training, and anticipated with pleasure a senatorial career in harmony with his cherished tastes, which would open to him a field of usefulness and honor worthy to enlist his highest energies. Moreover, he went to Chicago to represent the interests of Hon. John Sherman, which he did faithfully and ably. But, after two days of undecisive balloting in the convention, in which it became evident that none of the prominent candidates could secure enough votes for a nomination, on the thirty-sixth ballot there burst forth a general and resistless enthusiasm for Gen. Garfield, and, against his earnest expostulations, he received 399 of the 755 votes cast, and his nomination was unanimously confirmed. On Nov. 2 the election resulted in 4,449,053 votes for James A. Garfield, while Winfield Scott Hancock, the rival candidate, received 4,442,035. The electoral votes for the former were 215, for the latter 155. On March 4, 1881, James A. Garfield was inaugurated President of the United States, with the hopes of the nation in an unusual degree centred in him. His broad culture, his large experience in national legislation, his thorough acquaintance with public affairs and with all questions involving our relations to other nations, and his unquestioned integrity and patriotism, created confidence that he would manage justly and wisely the interests of the whole country. But the few months of his administration were insufficient to develop fully its spirit and aims. His career was suddenly ended by the hand of an assassin. Mrs. Garfield, just recovering from a long illness, was at Long Branch, New Jersey; and the President had made arrangements for a brief release from the cares of state, that he might visit his wife at the seaside, and afterwards pay a short visit to the beloved scenes at Williams College, and arrange for the entrance into that institution of two of his sons.

On July 2 he proceeded to execute this purpose, reaching the depot of the Baltimore and Potomac Railroad in Washington at 9.30 A. M. Just after he entered the building, and while passing with Secretary Blaine through the ladies' waiting-room, two pistol-shots were heard in quick succession, and the President tottered and fell to the floor. The assassin was seized and gave his name as Charles Jules Guiteau. The pistol in his hand was found to be of heavy calibre. On examination of the wounded President it was found that the ball had entered the right side of his back, near the spinal column and immediately over the hip-bone, but the ball could not be found. Having been conveyed to the offices of the railroad on the second floor of the depot building, the sufferer, after a consultation of physicians, was borne in an ambulance to the White House. Mrs. Garfield was immediately sent for, at the President's request, and then began a notable struggle of eighty days between life and death, which enlisted the sympathies of the world and crowned the sufferer with the sublimest of his honors—that of calm, untrembling faith, and heroic endurance. The best medical and surgical skill, joined to his own unruffled patience and indomitable courage, and the loving ministrations of his devoted wife, failed to rescue him from the grasp of death. A nation in prayers and tears, hoping against hope, appealed to heaven for the recovery of their beloved President. The daily bulletins from the sick-room for a time gave encouragement that his life would be spared; but, as the days and weeks wore anxiously on, it became apparent that the protracted struggle for life was growing weaker, and the "one chance in a hundred" for victory at the start was rapidly diminishing. On Sept. 6, after sixty-six days of suffering in the stifling and malarious atmosphere of Washington, the President was removed in a special railroad train to Elberon, N. J., to the cottage of Mr. Charles P. Francklyn, by the sea—a journey of 233 miles. The longing for the sea, awakened in his early youth, had never entirely died out of him; and now, as death approaches, it revives in all its freshness. Here, on Sept. 19, on the eightieth day of his sufferings, at 10.30 P. M., in the presence of his anguished wife, three of his physicians, and several members of his household, after untold physical suffering, James Abram Garfield calmly drew his last breath and yielded his spirit to God.

A post-mortem examination of the President's body was made on the afternoon of Sept. 20 by the attending and consulting surgeons, assisted by Dr. D. S. Lamb, assistant surgeon of the Medical Museum at Washington, and Dr. A. H. Smith, of Elberon. From the official bulletin prepared by the surgeons, setting forth the results of the autopsy, we quote as follows:

> "It was found that the ball, after fracturing the right eleventh rib, had passed through the spinal column in front of the spinal cord, fracturing the body of the first lumbar vertebra, driven a number of small fragments of bone into the adjacent soft parts, and lodging below the pancreas, about two inches and a half to the left of the spine, and behind the peritoneum, where it had become completely encysted.
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> "The immediate cause of death was secondary hemorrhage from one of the mesenteric arteries adjoining the track of the ball, the blood rupturing the peritoneum, and nearly a pint escaping into the abdominal cavity. This hemorrhage is believed to have been the cause of the severe pain in the lower part of the chest complained of just before death. An abscess cavity, six inches by four in dimensions, was found in the vicinity of the gall bladder, between the liver and the transverse colon, which were strongly adherent. It did not involve the substance of the liver, and no communication was found between it and the wound.
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> "A long suppurating channel extended from the external wound, between the loin muscles and the right kidney, almost to the right groin. This channel, now known to be due to the burrowing of pus from the wound, was supposed during life to have been the track of the ball.
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> "On an examination of the organs of the chest evidences of severe bronchitis were found on both sides, with broncho-pneumonia of the lower portion of the right lung, and, though to a much less extent, of the left. The lungs contained no abscesses and the heart no clots. The liver was enlarged and fatty, but not from abscesses. Nor were any found in any other organ except the left kidney, which contained near its surface a small abscess about one-third of an inch in diameter."

On September 21 the remains of the President were removed from Elberon to Washington, where the body lay in state in the rotunda of the capitol for the most part of two days and nights. Funeral services were held in the rotunda, and the remains were then conveyed from Washington to Cleveland by railroad. On the morning of the 26th the burial services were held, and the casket was finally deposited in the tomb prepared for it.

No death ever called forth such general lamentation. It was not only the unparalleled sorrow of a bereaved nation, but a sorrow worldwide in its scope. America, Europe, Asia, Africa, and the islands of the sea united to mourn the death of this illustrious man, all claiming a common kinship with him as a friend of humanity, a noble champion of truth and right. His was a life of scarcely half a century, but the half century in which he lived was, perhaps, the grandest in the history of human progress. In the stirring history of these fifty years James Abram Garfield stands forth a commanding figure—his life opening in a humble log-cabin in the wilderness, made illustrious by its services to his country and to humanity, and closing amid the tears and lamentations of the world.

Eulogies on him were delivered by Senator G. F. Hoar at Worcester, Dec. 30, 1881, and by Hon. J. G. Blaine before Congress, Feb. 27, 1882.

Literature.—The Garfield Family in England, by Wm. P. W. Phillimore, in the *New England Historical and Genealogical Register* (July, 1883); *Ohio in the War: Her Statesmen, her Generals, and Soldiers*, by Whitelaw Reid (Cincinnati, 1868); *The Works of James Abram Garfield*, edited by Burke A. Hinsdale (2 vols., Boston, 1883). (I. E.)

GARIBALDI, GIUSEPPE (1807–1882), the Italian revolutionary leader, was born at Nice, July 4, 1807. He was a sailor, like his father, and, having seen the sufferings of many parts of Italy, became filled with a desire to remove them. His conspiracy at Genoa, in 1834, resulted in his own exile. Taking refuge at Marseilles, he still sailed on the Mediterranean, and then entered the service of the Bey of Tunis. In 1836 he crossed the Atlantic to Rio Janeiro, where he engaged in trade, but without success. Under the influence of Zambeccari, Garibaldi and other Italians sailed in a little vessel, called the Mazzini, to aid in establishing the independence of the republic of Rio Grande. Garibaldi was severely wounded in the neck, and, having landed on neutral ground, was refused permission to leave. Chafing under confinement, he made a desperate effort to escape, but was captured. Though tortured, he refused to disclose the names of those who had given him aid. His next attempt at flight was successful. After some service in a land expedition under President Gonzalez against the Brazilians, he returned to the element with which he was more familiar. At the close of the war he settled at Montevideo, having taken to wife Anita Leonta Crousa, a creole, who henceforth shared all his adventures till her death. When Uruguay was attacked by Buenos Ayres, though the little republic was reduced to desperate straits by the treachery of some of its officers, Garibaldi commanded its naval force. He also organized an Italian legion, by the aid of which Montevideo was saved. It was at this time that, being without an officer's uniform, he first made his red shirt serve as such. In 1848 the movements in his native land seemed to call for his services, and, embarking with his legion in the Speranza, he sailed for Italy. He was received coldly by the king, Charles Albert, and after the defeat of the Sardinians at Novara Garibaldi entered the Sardinian Chamber of Deputies as a member of the opposition. A Roman republic was organized in 1849 by Mazzini and others, who eagerly invited Garibaldi to take command of its army. At first he guarded the frontier towards Naples, but when, in April, Marshal Oudinot led an expedition from France to restore the pope, Garibaldi met him before Rome, and after a vigorous contest of several hours drove him back to Civita Vecchia. Turning then to the south, he defeated the Neapolitans at Velletri. But, in spite of the gallantry which he infused into his troops, the French, with greatly superior numbers, became masters of Rome in July. Garibaldi withdrew towards San Marino, where he found an Austrian army confronting him, while the French pressed on his rear. The Austrians, when he offered to surrender, refused to guarantee the safe dismissal of all his troops. Leaving behind such as chose to accept the terms, he pushed towards the Adriatic with some hundreds of his men. Their attempt to escape in fishing-boats was frustrated by the presence of the Austrian squadron. When Garibaldi landed again, his wife, overcome with the toils and dangers which she had resolutely shared, died on the shore. Having buried her there, he set his face westward and crossed Italy on foot, though proclamations had been issued denouncing the penalty of death to any one who should assist him. He was arrested by Sardinian troops at Chiavari, and after some deliberation was banished by that government.

He sailed for New York, and on his arrival in July, 1850, declined the demonstrations in his honor by those interested in his career. Quickly he settled down as a candle-maker on Staten Island, and was naturalized as an American citizen. Afterwards he took command of a merchant vessel and sailed to the Pacific, where he spent three years. Meantime, under the wise guidance of Count Cavour, Sardinia entered upon a new career. Garibaldi was permitted to return to his native land. The outbreak of the war with Austria in 1859 gave him a fresh opportunity to display the intensity of his hostility to that government and his ability as a leader and inspirer of volunteers. Being appointed major-general and commissioned to raise a corps, he organized the hardy "Hunters of the Alps," who performed prodigies of valor on the plains of Lombardy. After the peace of Villafranca, Garibaldi used his influence to secure the annexation of the Italian duchies to Sardinia, but he was doomed to the grief of seeing his native city ceded to France in spite of his energetic protests.

Though his ardently cherished and openly avowed desire for the unification of Italy was thus wounded by an act which affected him personally, he did not relax his efforts to free other parts of the country from Bourbon rule. The weakness, worthlessness, and wickedness of the Neapolitan government had long been patent to all Europe. Garibaldi determined to free the suffering people from the tyranny which crushed them to the earth. With 1000 devoted followers he sailed on May 6, 1860, from Genoa to Palermo and within a month became dictator of Sicily. The whole structure of Bourbon government crumbled into fragments. In a few weeks a new government was organized, an army and navy provided. He then crossed the Strait of Messina and rested not till he had driven Francis II. from his throne. Dictator now of the Two Sicilies, Garibaldi wished to march to Rome and from the Quirinal proclaim Victor Emmanuel King of Italy. But Napoleon III., distrusting the effect of this movement, interfered and made the Sardinian king rest content with part of the States of the Church. Victor Emmanuel entered the city of Naples in company with Garibaldi, who then resigned his power to the king. Refusing any title or other reward, the true republican retired to the little island of Caprera. Rome and Venice were still wanting to the unification of Italy. To their recovery he gave his thoughts, while the sovereigns of Europe and the leaders of modern democracy listened for his words and noted his actions. In 1861 he was elected to the Chamber of Deputies, and in 1862 he was made general of the National Guard. When he took advantage of his position to raise a Hungarian legion for service against Austria, the Italian government was compelled to disavow his acts and remove him from command. He worked best when untrammelled by the restraints of office. Forming new plans for the capture of Rome, he gathered about 2000 volunteers, and, in spite of several French vessels sent to cruise near Caprera, he crossed to the mainland. But the Italian troops encountered and defeated him at Aspromonte, Aug. 28, 1862. Garibaldi and his son Menotti were wounded and most of his men captured. Only the skill of Dr. Nélaton, who came from Paris, spared Garibaldi the necessity of amputation. After two months' imprisonment at Spezia he returned to his island home. Though still elected to the Chamber of Deputies he took little interest in its proceedings. In the brief Austrian war of 1866 he went to the Tyrol, but the sudden close of the war prevented him from performing any exploit. Yet, when peace was made, he had the satisfaction of seeing Venice ceded to Italy. The veteran patriot now resumed his designs on Rome, which the Italian government for international reasons was obliged to oppose. However, in October, 1867, he succeeded in joining a revolutionary force in the papal territory. After gaining a victory at Monte Rotondo, he was defeated by the French and papal troops at Mentana, Nov. 3. Being arrested he used his American citizenship as a plea for release and was permitted to retire to Caprera. Here he lived quietly for nearly three years, but the desperate situation of the French republic in October, 1870, evoked the sympathies of the chivalrous old man. Offering his services to Gambetta at Tours, he took command in the Vosges for a few weeks, but without effecting anything. Though elected to the French National Assembly he took no part in its deliberations, and soon resigned his seat and his military commission. In 1873 pecuniary embarrassments overtook the old hero, which were aggravated by the faithlessness of a depositary, who fled to America. Garibaldi refused assistance which was offered from many sides, and declined a pension from the government. In 1874 he was elected a representative of Rome in the Chamber of Deputies, and made a triumphal entry in January following. The king and Prince Humbert showed him special marks of respect. Garibaldi proposed in Parliament various plans for the prevention of inundations of the Tiber and the Arno and for the improvement of the campagna. Some of these plans were approved and adopted by the government. Garibaldi did not cease however his opposition to the political course of the government. His dream that all Italian-speaking districts, whether possessed by Austria, Switzerland, or France, should be added to the kingdom of Italy, was not yet realized. Depretis, who became minister in 1876, favored this idea for a time, but afterwards abandoned it.

On account of the state of his health, undermined by hardships, Garibaldi now rarely left Caprera except to attend the Chamber of Deputies. In 1881 he called on the king at Rome and obtained the release of his son-in-law Canzio. He died at Caprera, June 2, 1882, having only a few weeks earlier assisted in the celebration at Palermo of the 600th anniversary of the Sicilian Vespers. He was buried on the island on June 8, being followed to the grave by prominent representatives of the government as well as delegates of 300 associations. Through all his life he had remained faithful to the dreams of his youth, and aided largely in their accomplishment. To him more than any other belongs the honor of the unification of Italy in a government in which the wishes of the people are heard and obeyed.

In his later years Garibaldi found time to compose two novels, *Cantoni il volontario* (1870) and *Clelia, ovvero il governo monaco* (1870). The latter has been translated into English as *The Rule of the Monk, or Rome in the Nineteenth Century.* He also published *The Thousand* (1876), an account of his expedition to Sicily in 1860. See *Life of Garibaldi, written by himself,* translated by Theodore Dwight (1860). (J. P. L.)

GARLAND, AUGUSTUS HILL, an American statesman, was born near Covington, Tenn., June 11, 1832, but was soon removed to Arkansas. He graduated at St. Joseph's College, Bardstown, Ky., in 1849, studied law and was admitted to the bar at Washington, Ark., in 1853. He removed to Little Rock in 1856, and was a delegate to the convention which passed the ordinance of secession in 1861. He was a member of the Confederate Congress, and when the war closed was a Confederate senator. He was elected to the U. S. Senate for the term beginning in 1867, but was not admitted to a seat. He then practised law until 1874, when he was elected Governor of Arkansas without opposition. In 1876 he was elected to the U. S. Senate and was re-elected in 1883. In March, 1885, he was called into Pres. Cleveland's cabinet as attorney-general.

GARNEAU, FRANÇOIS XAVIER (1809–1866), a Canadian historian, was born at Quebec, June 15, 1809. He was admitted as a notary in 1830, was afterwards clerk of the legislative assembly, and in 1845 became clerk of the city of Quebec. He published *Voyage en Angleterre et en France dans les années* 1831–33, and *Histoire du Canada* (3 vols., 1845–52). The latter has been translated into English. Garneau died Feb. 3, 1866.

GARNET, HENRY HIGHLAND (1815–1882), a negro clergyman, was born in Kent co., Md., Dec. 23, 1815. He was a slave and his father George was a slave also; but the grandfather was a Mandingo African chief. George Garnet escaped from slavery in 1824, and went to New York city in 1825. Henry attended the African Free School in Mulberry Street, noted for the number of distinguished men of color who were among its students. Obliged to leave school at an early age, he made two or three voyages as a cook. In early youth he became crippled in his right leg, which left him maimed for life. He early attached himself to the Presbyterian church under Theodore S. Wright, the leading negro preacher of his day. Turning his attention toward the ministry, Garnet in 1835 went to Canaan Academy, N. H., but prejudice against the education of colored children soon broke up the school, and he returned to New York city. He afterward attended the Oneida Institute, Whitesboro, N. Y., one of the seven places in the United States at that time open to colored youth. Rev. Beriah Green was the president. Garnet here pursued his academic studies with profit and zest, and was graduated in 1839. While teaching school at Troy, he still pursued his theological studies. He was licensed to preach in 1842; was pastor of the Liberty Street Presbyterian Church in Troy for ten years, during which time he edited a paper in the interests of the colored people called the *Clarion.* In 1841–42 the colored people of New York State were demanding suffrage, and conventions were held at various places in the State. Garnet became the leading spirit. At the convention of the Liberty Party, at Buffalo, N. Y., 1843, the *Gazette* said of Garnet's speech, "It fairly enchained the audience over whose passions, affections, and actions the speaker appeared to have perfect control." Once entered upon a semi-political career, Garnet became an active worker in different fields. While he retained his connection with the church, he became an anti-slavery orator, a temperance lecturer, the agent of Gerrit Smith in settling the colored people on lands in the State of New York. In 1850 he visited England, and travelled over the United Kingdom preaching and lecturing. He was a delegate while abroad to the Peace Congress at Frankfort. For a brief period he became a missionary and temperance advocate in Jamaica. He returned to the United States and preached successively in New York, Washington, and again in New York city. At the breaking out of the rebellion he promptly called upon colored men to enlist in any capacity, foreseeing the beneficial effects of the war upon his race. He accepted the chaplaincy of a camp of colored soldiers, and was active in organizing a committee for hospital service. He barely escaped with his life during the anti-negro riots in New York in 1863. He was the first colored man who ever spoke in the House of Representatives at Washington. He preached a sermon there Sunday, Feb. 12, 1865, afterwards published in pamphlet form. In the "Exodus" of 1879 he was untiring in his efforts to assist his suffering brethren fleeing from the South. In 1881 he was appointed by Pres. Garfield minister-resident and consul-general at Monrovia, Liberia. He sailed for Africa Nov. 12, 1881, and died Feb. 14, 1882, after a brief illness. Dr. Garnet was an unmixed negro of the best type, an eloquent speaker, bitter and sarcastic when need be, but polished and suave on occasion. In early life he issued an edition of *Walker's Appeal*, and printed numerous pamphlets and sermons. He was always the friend of African civilization, and he was elected an officer of the American Colonization Society. His first wife, Julia Williams, was one of the colored girls driven with Prudence Crandall from Canterbury, Conn., in 1833, for daring to seek the springs of knowledge. His second wife, who survives him, Sarah J. S. Thompson, was a teacher among the colored people in New York city. Dr. Garnet's life illustrates the romance of the American negro—a slave, a partial freeman, enfranchised by war, a preacher, orator, editor, lecturer, and diplomat, driven from New England by prejudice, a graduate of a mixed school in New York State, the friend of Lincoln, Thurlow Weed, Grant, and Garfield, returning after nearly sixty years of active life in America to die in the home of his grandfather, a representative of the government which once denied his right to citizenship and refused him a passport on going abroad in 1850. (R. T. G.)

GARNETT, RICHARD, an English author, born at Lichfield, Feb. 27, 1835. His father, Rev. Richard Garnet, who died in 1850, was an eminent author and philologist and one of the librarians of the British museum. The younger Garnett succeeded his father as assistant keeper of that great library, and in 1875 became superintendent of the reading-room. Among his works are a volume of poems called *Primula* (1858); *Io in Egypt and other Poems* (1859); *Poems from the German* (1862); *Idyls and Epigrams* (1869); and a valuable volume entitled *Relics of Shelley.* He has also edited his father's *Philological Essays* (1858); *Shelley's Minor Poems* (1880), and the *Florilegium Amantis* of Coventry Patmore. Mr. Garnett has written many of the best biographical articles in the ENCYCLOPÆDIA BRITANNICA.

GARNIER-PAGÈS, LOUIS ANTOINE (1803–1878), a French statesman, was born at Marseilles, July 18, 1803. Being engaged in business at Paris, he took part in the revolution of July, 1830, and afterwards was elected to the Chamber of Deputies. He was a Republican and gave special attention to the finances. In the provisional government of 1848 he was minister of finance, and to prevent the national bankruptcy he insisted on an extra taxation, the extreme unpopularity of which drove him soon after into private life. He did not emerge until 1869, though he frequently criticised the financial administration of the empire. On the downfall of this government he took part in the defence of Paris, but had no influence on subsequent events. He died at Paris, Oct. 31, 1878. He published *Histoire de la Revolution de* 1848 (8 vols., 1860–62); *Histoire de* *la Commission Executive* (1869); *L'Opposition et l'Empire* (2 vols., 1872).

GARRETSON, James Edmund, an American physician, was born at Wilmington, Del., Oct. 4, 1828. He graduated at the University of Pennsylvania in 1859, and began practice in Philadelphia. He began to lecture on anatomy in 1861; in 1869 was made oral surgeon to the University of Pennsylvania; and in 1880 dean of the Philadelphia Dental College. By his efforts oral surgery has been erected into a surgical system, in which he has performed many noteworthy operations. Besides his *System of Oral Surgery* Dr. Garretson has written several books of practical philosophy in a somewhat humorous vein. These have been published under the name of "John Darby," and comprise *Odd Hours of a Physician*, *Thinkers and Thinking*, *Hours with John Darby*, *Brushland*, and *Two Thousand Years After*.

GAS, ILLUMINATING. The use of inflammable gas as a light-giving agent had its inception in the burning of the gas which rises naturally from the earth in many regions. Its production artificially is of recent date.

See Vol. X. p. 79 Am. ed. (p. 87 Edin. ed.).

Of the gas used in modern cities coal is the principal source, though many other substances have been employed, such as wood, peat, rosin, petroleum, oils, fats, water, and even organic refuse of several kinds. Coal-gas was made and burned as an experiment late in the seventeenth century, and again about 1720. In 1786 Culross Abbey was lighted with gas also, as an experiment. Its first practical employment was in 1792, when William Murdoch used it to light his workshops, at Redruth, in Cornwall. His success led to its extended use. Its first employment in public street lighting was in Pall Mall, London, on Jan. 28, 1807. The first gas company was the "Chartered Gas-Light and Coke Company," chartered in London in 1812. By 1820 it had become more satisfactory as an illuminating agent, had extended to other cities, and had come into use in Paris and some other cities on the Continent. By 1829 there were about 200 gas-works in Great Britain.

In the United States, gas for illumination was first made by David Melville, of Newport, R. I. He lighted his own house and the street in front of it with gas in 1806. In 1813 he took out a patent, and lighted several factories. In 1817 his process was applied to Beaver Tail light-house, being the first use of gas for this purpose. An attempt was made to manufacture gas in Baltimore in 1816, but success was not attained until 1821. In the succeeding year gas was introduced into Boston. In 1823 the New York Gas-Light Company was formed, but the demand was so limited that it was not in active operation until 1827. By 1830 success was assured, and a rival company, the Manhattan, was established. Both companies made their gas from oil and rosin until 1849. In Philadelphia the manufacture of gas has always remained an interest of the corporation, not of private companies. This stood in the way of its early employment, and it was not introduced until 1835. Since these dates, the use of coal-gas has been widely extended throughout the country, in small as well as in large communities, and there are now probably over 500 companies in operation, with an enormous capital, the plant of the New York companies alone being estimated at a value of $45,000,000.

The manufacture of coal-gas has been for many years slowly improving in efficiency, through the invention of new methods and the higher development of old processes. It has made important steps of progress within the last twelve years, partly through the incitement of competition with the electric light. Since about 1873 the tendency in gas-works has been to use higher temperatures and larger retorts. As a result the yield of gas per ton of coal, in the best managed works, has increased from 9500 to 11,420 cubic feet, while the daily yield per retort has advanced from 6000 to 9000 cubic feet. The regenerative principle of the Siemens' furnace has been applied to the production of a more intense heat, with a marked economy in fuel and labor, and a superior yield. The furnace employed is an economical modification of the Siemens' furnace. It comprises a deep fire-place, with a grate of small area. A limited supply of air, sometimes with a little steam, is admitted below, and passes through a thick bed of incandescent coke. Hydrogen and carbonic oxide gases rise, and pass into the oven containing the retorts. Here they meet a new supply of air, which has been previously heated, and a vivid and intensely hot combustion takes place, with a remarkable increase in the heat of the retorts. The hot gases arising from the combustion pass off through flues which run parallel with the flues through which the second air supply enters. They thus heat this air in their passage. In this process we have the Siemens' regenerative principle. The saving in fuel is said to be about 30 per cent.

The charging of the retorts has been simplified and cheapened by the substitution of machine for hand labor. In the latest invention the coal, hauled and placed in front of the door of the retort, is driven into it by the force of jets of steam with a considerable economy in labor. Also the glowing hot coke, as taken from the retorts, is at once used in the furnaces, not cooled off and this heat lost as in the old method. Improved and economical processes have been adopted in every other department of the manufacture. It took long to learn, after the introduction of gas, how to deprive it of its ammonia. The *scrubbers* now employed do this completely. The gas is made to rise through coke or other material placed in a tower down which water slowly trickles, absorbing the gaseous ammonia in its descent. Less than a gallon of water suffices to clean 1000 cubic feet of gas, while the ammoniacal liquid obtained is a product of great value. In another system revolving perforated disks are employed, the lower part of which dip into water. The gas passes through the perforations and yields its ammonia to the trickling water. Other improvements in the purification of gas of a less striking character have also been adopted, and the cost of manufacture has been considerably reduced by these various steps towards economy and efficiency.

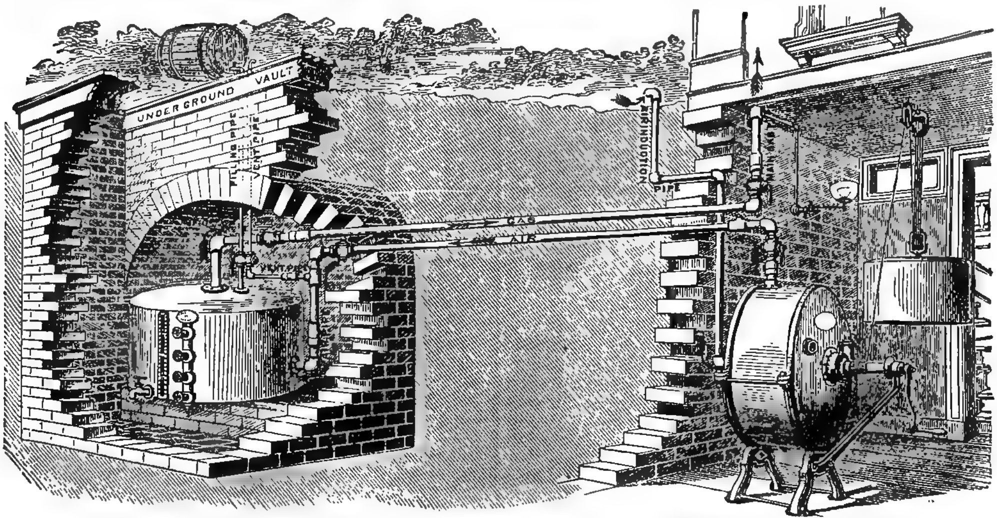
The manufacture of what is known as water-gas has become an important branch of the industry of late years. Its main principle is the mixture of hydrogen with the vapor of some hydrocarbon for illuminating purposes. The hydrogen-gas is obtained by the decomposition of water, effected by passing steam through highly heated coals. Hydrogen, as is well known, burns with very little light, and the purpose of the hydrocarbon is to increase the brilliancy of the flame. The first patent in which hydrogen is used for purposes of illumination was granted in London, in 1824. Michael Donovan in 1830, George Lowe in 1832, Stephen White in 1847, and other inventors took out patents for improved processes in water-gas manufacture, and for the enriching of coal-gas with hydrogen or hydrocarbon vapors. But none of these methods have been able to compete with coal-gas in cheapness, in England.

In the United States the contrary has been the case, and water-gas manufacture has greatly developed of late years. This is due to the cheapness of petroleum and its products as sources of the hydrocarbon vapors. Several processes are employed, of which the simplest and most economical is the Lowe process, the invention of T. S. C. Lowe, of Norristown, Pa. In this method anthracite coal is charged into a cupola, or blast-furnace, and brought to an intense heat by an air-blast. Then the blast is shut off and superheated steam admitted a little above the grate bars. The steam is decomposed into a mixture of hydrogen and carbonic oxide. At the same time a small stream of naphtha, or crude petroleum, is thrown upon the surface of the burning coal, yielding a vapor which mixes with the preceding gas. Besides this cupola are one or more others filled loosely with fire-bricks, which are heated. Through them the mixed gases pass, and the vapor of naphtha is decomposed into olefiant and other light-giving gases. The remaining processes of scrubbing and purifying are as in coal-gas manufacture. The charge used is about 280 gallons of petroleum to 3600 pounds of anthracite for a yield of 70,000 cubic feet of gas.

The Lowe system was first put into successful operation at Phœnixville, Pa., about 1873. It was afterwards introduced into Utica, N. Y., and in 1876 a larger establishment was operated in Manayunk, Pa. Since these dates it has made its way to a considerable use in the Northern States and Canada. In another method, known as the Strong process, no naphtha is employed, the purpose being to produce a heating instead of an illuminating gas. In this the steam is first passed through the regenerator and introduced in a highly heated state at the top of the furnace, while coal-dust is at the same time showered in at the top. The steam is partly decomposed by contact with the coal-dust, while the process is completed in its passage through the burning coal.

The Municipal Gas-Works of New York, the first to adopt the water-gas process, employ the Tessié du Mothay system. In this the three processes of gas generating, carburetting, and roasting, or fixing, are conducted separately. The *fixing* retorts correspond to the regenerator in the Lowe process, the naphtha vapor being converted into higher hydrocarbons, which make a more stable or *fixed* gas. The system is less economical in theory than the Lowe, but seems to work about as well in practice. In some of the other New York companies an intermediate system is employed, the basis of the manufacture being coal-gas, which is enriched with naphtha vapors.

The American hydrocarbon process, as introduced into the city of Poughkeepsie in 1875, is a simplified application of the same general principles. It yields a gas which it is claimed can be made at the rate of 50 cts. per 1000 feet. The common objection to gases of this character is that the gas is not permanent. The hydrocarbon is not fully gasified, leaves a deposit in the pipes, and smokes when burned. In the Wren process it is claimed that this difficulty is obviated, the oil vapor being so thoroughly heated as to be converted into a permanent gas. The inventor claims that gas can be produced by his process for 36 cts. per 1000 feet.



Generator in Vault, 50 Feet or more from House.

Air Pump in Cellar of House

Domestic Gasoline Apparatus.

Gasolene.—In cases where buildings are situated beyond the reach of city gas-mains it becomes necessary to find some substitute for coal-gas, and a very effective one is found in the use of gasolene, a highly volatile liquid distilled from naphtha. The vapor from this is so highly inflammable that it is necessary to keep it in a vault, or bury it underground, at a safe distance from the house to be lighted. For purposes of burning the vapor is mixed with atmospheric air. The apparatus is composed of two parts, a cylinder containing the gasolene, and an air-pump, placed in the cellar of the house. This air-pump is operated by a descending weight, and forces the air through a pipe to the gasolene reservoir. This is a cylinder containing a series of evaporating chambers, partly filled with gasolene, and containing a succession of fibrous webs, which become saturated with the liquid. The air passes successively through these chambers, and winds through their webbed subdivisions, until it becomes thoroughly saturated with the vapor rising from the gasolene, and enters the supply-pipe as a richly carburetted air-gas. This flows back to the building through gas-pipes and is conducted to the burners, where it yields an excellent and agreeable light, without smoke or odor. The machine works automatically, since the closing of the burners checks the air-flow and stops the pump, while it moves again the instant the burners are opened. The supply in the generator usually lasts from 3 to 6 months, while gauges are used to show the height of the liquid in the chambers.

Natural Gas.—Within the United States the gas naturally arising from wells in the petroleum district of Pennsylvania and the adjoining States has been for years past used in some localities as an illuminant, and as a source of heat and power. It is now largely used where gas-wells exist in the vicinity of towns. But a marked advance in its use has taken place within recent years by its conduction through pipes to distant places. In the city of Pittsburg the use of natural gas has grown with such rapidity that it bids fair ere long to completely supplant coal in that city, both for domestic and for manufacturing purposes. It is stated that the disuse of coal in Pittsburg, through the introduction of natural gas into its manufactories and dwellings, amounts at present to about 10,000 tons daily, or more than 3,500,000 tons per year. As a consequence good coal-lands in that vicinity are now offered at $30 per acre, while gas-well privileges have been sold for $5000 per acre. Discoveries of new gas-wells are of not unfrequent occurrence, while some of those now in use have been yielding without diminution for years.

The gas can be supplied very cheaply; it is remarkable for its cleanliness and labor-saving as compared with coal, and its use is likely to rapidly extend. Projects are even now on foot to convey it to New York and Philadelphia, and it is possible that, ere many years, these cities will get their light and heat from this earth-born fuel.

The gas-well, however, has one ever-present element of uncertainty, which is, that its supply may give out at any moment, without warning. Its lack of odor is also a dangerous quality, as its escape through leaky joints can only be discovered by an explosion. Yet the use of natural gas has called the attention of manufacturers to the superiority of gaseous over solid fuel, even when artificially produced. Gas-fuel has been employed for some time in several iron-works in and near Philadelphia, with considerable saving, and the glass-works of Ohio are now using it at a saving of 25 per cent. in cost of fuel. This gas is made of coal-slack, of no value at the mines, and existing in great quantities. The time may come, ere many years, when gas-fuel will completely replace coal, as more economical and manageable. The coal may be converted into gas at the mines, and conducted to the cities in pipes, as natural gas now is. Of late years gas-stoves for heating and cooking have come into increased use. Gas is not greatly more expensive than coal as an agent in cooking, while it is far more convenient. Gas-engines have also come into use to some extent. They are cheaper in operation than those run with coal, but more troublesome. Their principal advantage is where the work is intermittent and the power required small. They start at once into full action, and the expense ceases the instant they stop running. Twenty cubic feet of gas per horse-power is as low as the best of them consume.

In consequence of the various improvements in its manufacture the price of gas to consumers has steadily decreased of late years. From a price of some $4 per 1000 feet, or considerably more where the consumption was light, it has declined to prices which range from $2 in some localities to as low as $1 in others. In some of the English cities its cost is considerably less than this, partly through greater cheapness of fuel and labor, and partly through more economical management. The probability is that its price will be still further reduced in this country, and that, if replaced as an illuminant by electricity, it will come into increased use as a source of heat and power. The immense service called for from some gas-works of late years has rendered necessary gas-holders of increased capacity, and some of those recently built are of enormous size. One in London, the largest in the world, has a capacity of 5,500,000 cubic feet. The Municipal Gas Company of New York has one of 2,000,000 feet capacity, and the New York Gas-Light Company has two of 1,500,000 feet each.

The Siemens' Burner.—In relation to gas consumption we need here speak only of the most recent improvement in that direction, the Siemens' regenerative burner, in which the principle of the regenerative furnace has been successfully employed. It differs in principle from ordinary burners in that the gas and the air are not supplied cold, as in ordinary burners, but are heated before combustion. This difference makes a very notable difference in the intensity of the light yielded. In the Siemens' burner the hot products of combustion are not permitted to at once escape, but are carried downwards through a chamber to an escape-flue at the bottom. In so doing they yield heat to the entering air and gas, which are passing upward through adjacent flues. In consequence, when these reach the burners, they are considerably raised in temperature. The consumption is more complete, and the illumination nearly three times that yielded by ordinary burners.

The Siemens' lamps are only suitable for lighting large spaces, for which purpose they are now being rapidly introduced. But several new inventions are in the market, in which this principle is adapted to smaller lamps, suitable for domestic service. In these the flame is inverted, and burns downward. The heat of the products of combustion seems very perfectly taken out by the new entering gas and air, so that the external heating effect is greatly reduced. It seems certain that a lighting effect at least double that now attained in domestic use will be yet gained by the application of this regenerative principle. (C. M.)

GASPARIN, AGÉNOR ÉTIENNE, COMTE DE (1810-1871), a French publicist, was born at Orange, July 10, 1810. His father, Count Adrien É. P. (1783–1862), in 1836 was secretary of the interior. He gave much attention to agriculture, and published some large works on the subject. Agénor was employed under his father while minister, and in 1842 was elected to the Chamber of Deputies. Though classed as a conservative, he favored many liberal measures, being moved thereto by his Protestantism. He was in the East during the Revolution of 1848, and refused to give approval of the republic then established or of the empire which followed. He removed to Switzerland, and lectured at Geneva on historical and religious subjects. He expressed warm friendship for the cause of the Union during the American civil war, and published two works in its behalf: *Les Etats-Unis en* 1861; *Un grand peuple qui se relève* (1861), and *L'Amerique devant l'Europe* (1862). These were translated and published in New York as *The Uprising of a Great People* and *America before Europe.* He was also a frequent contributor to the *Revue des Deux Mondes* and other periodicals. He died at Geneva, May 14, 1871, his death being hastened by his philanthropic labors in behalf of French refugees. Besides the works mentioned above he published others on French Protestantism, Spiritualism, the family, moral liberty. After his death his *Life of Innocent III.* appeared (1874). His wife, VALERIE BOISSIER, born at Geneva, in 1813, has also published several books of travel, and treatises on religious, social, and moral questions.

GASTON, WILLIAM (1778–1844), an American jurist, was born at New Berne, N. C., Sept. 19, 1778. His father, Dr. Alexander Gaston, was of Huguenot descent, and on account of his active efforts in aid of American independence was shot by tories, Aug. 20, 1781. William was brought up by his mother, graduated at Princeton College in 1796, and admitted to the bar in 1798. In 1800 he was chosen to the senate of North Carolina, and afterwards to the lower house, of which he was speaker in 1808. He became a member of Congress in 1813, and was there distinguished by his eloquence and force of argument. This was especially seen in his speech against the Loan Bill, which proposed to place $25,000,000 at the disposal of the President. In 1817 he returned to the practice of his profession in North Carolina, and was soon at the head of the bar. In 1834 he was appointed a judge of the Supreme Court of the State, though he had become a Roman Catholic, and was, therefore, excluded by the State Constitution from holding office—no attempt being made to enforce the provision; and he held this position till his death, at Raleigh, N. C., Jan. 23, 1844. In 1835 he had been prominent in revising the State constitution, and opposed the clause depriving free colored men of the right of suffrage which they had previously enjoyed.

GATLING, RICHARD JORDAN, an American inventor, was born Sept. 12, 1818, near Murfreesborough, N. C. In boyhood he aided his father, Jordan Gatling, in designing a machine for sowing cotton-seed and thinning the young plants; and when 20 years of age he invented a screw for steamers. Among his later inventions were a machine for sowing rice and wheat; a new hemp-brake and a steam-plough. He studied medicine at Laporte, Ind., 1847–48, and in Cincinnati, 1848–49, and took a degree, but never practised his profession. Another of his inventions was one for transmitting power by means of compressed air. But his fame is principally based upon his great invention of the compound repeating or machine gun, known as the Gatling gun; the most original and successful battery or multiple gun yet devised. The invention of this fire-arm was made in 1861 and 1862, while Dr. Gatling was living in Indianapolis, Ind., but it scarcely came into use during the war of the rebellion. It has since been very much improved. It is now made in various forms, and is used by most civilized nations, both as an army and navy arm. (See "Machine-gun" in article "Gun-making" in Encyclopædia Britannica.) Dr. Gatling is a resident of Hartford, Conn.

GAULTHERIA (named by Kalm, the Swedish botanist, in honor of Dr. Gaultier, of Quebec) is a genus of plants belonging to the order *Ericaceæ*, and has numerous representatives in Asia, Java, Tasmania, New Zealand, etc., with three species in the United States. It belongs to the section *Andromedeæ*, which is described by Dr. Gray as having "fruit, a loculicidal chiefly five-celled and many-seeded capsule, the valves usually bearing the partitions, which separate from the persistent placentiferous axis or columella. Corolla gamopetalous, deciduous. Stamens twice the number of the corolla-lobes (mostly 10), more or less included. Leaves mainly alternate." The section *Arbuteæ* has baccate or drupaceous fruit, but though *Gaultheria* has the calyx fleshy and berry-like, it finally opens at the sides as described by Dr. Gray. The species of the Eastern United States is called *Gaultheria procumbens;* but it is not a procumbent plant, though of low growth in comparison with other species. The leaves are evergreen, and this fact has suggested "winter-green" as one of its common names. The pinkish-white flowers appear about the middle of summer, followed by bright red velvet-like berries in autumn, which remain on all winter if undisturbed. The whole plant and the berries have a very pleasant aromatic taste, similar to that of the sweet birch, and, like that, yielding a dark green essential oil, which has a specific gravity of 1.173. It is known as "oil of winter-green." It was known to the Indians in common with other plants of similar character, says Rafinesque, as "Pallom," and a tea made from the plant was used by them as a stimulant. The same author says the Missouri tribes of Indians called it "Moschar," and the Indians of Michigan and Wisconsin gathered and preserved the fruit for culinary uses. During the war of independence the leaves were used by the colonists in the place of Chinese tea, and it is said that they are little inferior to Chinese tea in value and more refreshing. From this use the berries are yet known as "tea-berries." They are somewhat in demand for mixing with beer and other drinks. They also enter considerably into the manufacture of popular tooth-powders and washes. The leaf having some astringency, has been found useful in medicine.

Gaultheria Shallon is the prevailing species along the Pacific coast. It was first described and figured in Pursh's "*Flora of North America,*" from specimens collected by Menzies and Lewis and Clarke, who gave it the specific name as the one under which it was known to the Indians of Oregon, though "Salal" is its present name. This is a small shrub, growing two or three feet high, chiefly in places so shaded by other larger plants that nothing else will grow, the fruit being the "Salal-berries" used for food.

Gaultheria Myrsinites is also a native of the more northern districts of the Pacific coast. It is low growing, spreading over the ground in tufts, flowers solitary in the axils of the leaves, and with naked, obscurely four-pointed anthers. Little is known of its economic value, but the *Botany of California* notes that the "fruit is scarlet, aromatic, and said to be delicious."

The Eastern species has had many common names besides those above cited; for instance, "partridge-berry," because game-birds are fond of the fruit, "checker-berry," "ground-holly," and others, which have become almost obsolete. (T. M.)

GAVAZZI, Alessandro, an Italian preacher and agitator, was born at Bologna in 1809. He received minor orders in 1825 and entered the order of the Barnabites. He was afterwards professor of rhetoric at Naples, and became a noted pulpit-orator. On account of his freedom of speech and thought he incurred censure, but on the accession of Pius IX. in 1846, he declared himself a devoted follower of the Pope's policy. In 1848 Gavazzi delivered in the Pantheon a fervid oration on the patriots who had fallen in the struggle against the Austrians at Milan. He continued to harangue the people on their duty as Italians, and the pope made him chaplain-general of the volunteer national army. These troops had reached Vicenza, when the pope, alarmed at the progress of the movement, recalled them to Rome. But Gavazzi, going to Florence, roused the people by his fiery appeals; then expelled from the duchy of Tuscany, he passed to Genoa, but soon returned to the pope's dominions. When the republican government was set up in Rome, Gavazzi as chaplain-general of the army exerted himself to sustain the spirit of the people until they were overwhelmed by the French in July, 1849. A few weeks later, in London, Gavazzi delivered before crowded houses fierce invectives against the Roman Catholic Church. He subsequently visited Scotland, then passed to the United States, and afterwards to Canada, where he encountered great opposition. His *Life, Sermons, and Lessons* were published at London in 1851. Henceforth he devoted himself to furthering the national movement in Italy, and in 1860 he accompanied Garibaldi's expedition to Sicily. In 1870 he again visited England, and in 1873 made a tour in the United States asking aid for a national free church in Italy. He has published *No Union with Rome* (London, 1871), and *The Priest in Absolution* (1877).

GAY, Ebenezer (1696–1787), an American minister, was born at Dedham, Mass., Aug. 26, 1696. He graduated at Harvard College in 1714, and in 1718 was settled as pastor over the church at Hingham, Mass., where he remained till his death, March 18, 1787. On his 85th birthday he preached from the text "Lo, I am this day fourscore and five years old." This sermon, under the title *The Old Man's Calendar*, was frequently reprinted, and other of his sermons were published. Dr. Gay was liberal in his theology, but conservative in his politics, and during the Revolution was ill treated by some of his own parishioners.

GAY, Sydney Howard, an American journalist, was born at Hingham, May 22, 1814. He graduated at Harvard College in 1833 and began to study law in his father's office. He became an anti-slavery lecturer and for several years was editor of the *Anti-Slavery Standard.* In 1858 he joined the staff of the *New York Tribune*, and was its managing editor from 1862 to 1865. He held a similar position on the Chicago *Tribune* from 1867 to 1871, and then returned to New York to take charge of the *Evening Post.* He is the author of Bryant and Gay's illustrated *History of the United States* (4 vols., 1876–80), and of a *Life of James Madison* (1884). His *History*, though badly proportioned, gives many evidences of careful research, and is marked throughout with a strong love of freedom.

GAY, Winckworth Allan, an American painter, brother of the preceding, was born at Hingham, Mass., Aug. 18, 1821. He studied painting under Robert Weir at West Point, N. Y., and under Troyon at Paris. He spent some years in Italy, and has since travelled in Egypt and Eastern Asia. He is noted as a painter of landscapes and especially of sea-coasts. He resides at Boston, where in 1877 he exhibited over a hundred pictures representing his career as an artist.

GAYARRÉ, Charles E. Arthur, an American lawyer and historian, was born at New Orleans, Jan. 3, 1805. He was educated at the College of New Orleans, studied law at Philadelphia, and was admitted to the bar in 1829. He was elected to the legislature of Louisiana in 1830, was appointed deputy attorney-general in 1831, and presiding judge of the city of New Orleans in 1833. He was elected to the U. S. Senate in 1835, but did not take his seat on account of ill health. He then went to Europe, and on his return in 1846 was made secretary of state in Louisiana, which position he held till 1853. He has published several works on the history of Louisiana, the most important of which is divided into three parts, *Spanish Domination in Louisiana* (1854); *French Domination* (1854); *American Domination* (1857; enlarged edition, 1869). He has also published a satirical sketch, *The School of Politics* (1854), two historical novels, *Fernando de Lemos* (1872), and *Aubert Dubayet* (1882), and a history of *Philip II. of Spain* (1866).

GAY-FEATHER is the most popular common name for plants of the genus *Liatris*, belonging to the eupatoriaceous tribe of *Compositæ.* It has flowers all tubular and perfect; achenia many-ribbed; the slender bristles of the pappus plumose or barbellata; and corollas strongly five-lobed. It comprises about a dozen species, which are mostly confined to that portion of the United States lying east of the Rocky Mountains. The roots of most of the species are tuberous, seldom exceeding a walnut in size, and abound in a balsamic resin, giving the plant, along with so many others, a reputation as a "rattlesnake-master." From this and the form of the root some of the species are known as "button-snake-root." Some of them are found to be diuretic, stimulant, and expectorant, and to have real value in medicine. On the prairies gophers and other rodents store the roots in large quantities under ground for winter use. Besides "gay-feather," the name given to these plants from their plumose habit of growth and inflorescence, some kinds have been called "throatwort," from their use as expectorants; "prairie pine," from the terebinthine odor of the roots; "spike-flower," from the long tapering inflorescence; and "blazing star," from their comet-like appearance when in flower—the heads of purple flowers opening from the apex of the spike downwards. *Liatris odoratissima* is the "Carolina vanilla-plant," or "deer's tongue." When properly cured it has the odor of vanilla, and it has been supposed by the ignorant to be the real vanilla, and chapters have even been written on the culture of vanilla in the South, which really had reference to this plant. It was recently exported to Turkey from Florida to some extent, for the purpose of imparting a good flavor to the finer preparations of tobacco; but the trade did not flourish.

The species of the genus give great beauty to American floral scenery. In the drier portion of the country, just east of the Rocky Mountains, *L. punctata* abounds, with some smaller intermixtures of a dwarf form of *L. scariosa.* As the more grassy regions are reached *L. pycnostachya*, perhaps the original "gay-feather," is the prevailing species. *L. squamosa* and *L. cylindracea* are found in Illinois, while *L. spicata* and *L. graminifolia* are common farther east. A few rarer species occur in the South Atlantic States. (T. M.)

GEARY, John White (1819–1873), an American general, was born at Mount Pleasant, Westmoreland co., Pa., Dec. 30, 1819. He studied at Jefferson College, Canonsburg, became a civil engineer, and was connected with the Allegheny Portage Railroad for several years. In 1846 he was lieutenant-colonel of a volunteer regiment which served in Mexico. He commanded the regiment at Chapultepec, where he was wounded, and was placed in command of the citadel of Mexico after its capture. He removed to San Francisco after the war, and in 1849 was postmaster, then alcalde, and in 1850 was elected the first mayor of that city. In 1852 he returned to his native county, settling on a farm. In 1856 he was appointed governor of Kansas by Pres. Pierce, and held that office till March, 1857. In 1861 he raised and equipped the Twenty-eighth Pennsylvania volunteers, and commanded them in some engagements in Virginia. In April, 1862, he was made brigadier-general. He was severely wounded at Cedar Mountain, Aug. 9, 1862. He commanded a division at Chancellorsville, Gettysburg, and at Lookout Mountain. In Gen. Sherman's campaign through Georgia in 1864, Gen. Geary commanded the Second division of the Twentieth corps. At the close of the war he retired from the army, and from 1867 to 1873 he was governor of Pennsylvania. He died suddenly at Harrisburg, Feb. 9, 1873.

GEFFRARD, Fabre (1806–1879), a Haytian general and president, was born at L'Anse-Veau, Sept. 19, 1806. He was a mulatto and son of Gen. Nicholas Geffrard, one of the founders of Haytian independence. Adopted after his father's death by Gen. Fabre, he entered the army in 1821, was captain in 1843, and assisted Gen. Hérard in overthrowing the government of Pres. Boyer. In the disturbances which followed he displayed great humanity as well as courage, and in 1845 he was made general of a division. Pres. Riche deprived him of his command, but on trial by a military tribunal Geffrard was unanimously acquitted. Soulouque, becoming President in 1849, restored Geffrard to command, and sent him against the Dominicans. When Soulouque assumed imperial dignity he made Geffrard duke of Tabara, but as Soulouque's popularity waned that of Geffrard increased. At last the emperor ordered Geffrard's arrest, Dec. 21, 1858, but he escaped to a neighboring island, and headed an insurrection in the French provinces. Soulouque was overthrown, and Geffrard entered Port-au-Prince in triumph, Jan. 15, 1859. He restored the republic and exercised clemency to the vanquished, allowing Soulouque and his family to go to Jamaica. But Geffrard's political opponents conspired against him, and in an attempt upon his life, his daughter, who had just been married, was assassinated. His attempts at reform met with much opposition, which was heightened by his moderation toward Spain when it took possession of the Dominican republic. In 1864 Salnave started an insurrection which soon became formidable. Although suppressed in 1865 with the aid of the English, it was renewed in July, 1866. Pres. Geffrard declared the abolition of capital punishment for political offences, and tried various conciliatory measures, but in vain. On March 13, 1867, Salnave gained possession of the capital, and Geffrard was obliged to take refuge on a French ship. He went to Jamaica, where he died in February, 1879.

GEIKIE, Archibald, a Scotch geologist, was born at Edinburgh in 1835. He was educated at the high school and university of that city, and in 1855 was appointed on the Geological Survey of Scotland. In 1867 he was made director of the survey, and in 1870 was appointed professor of mineralogy and geology in the University of Edinburgh. Besides contributing to many scientific and literary periodicals, he has published *The Story of a Boulder* (1858); *Phenomena of the Glacial Drift of Scotland* (1863); *Scenery of Scotland viewed in connection with its Physical Geography* (1865); and some text-books of geology and physical geography. He was associated with Dr. George Wilson in preparing the *Life of Prof. Edward Forbes* (1861), and wrote the *Memoir of Sir Roderick I. Murchison* (2 vols., 1874). In 1881 he was made director-general of the geological survey of the United Kingdom.

GEIKIE, James, a Scottish geologist, brother of Archibald, was born in Edinburgh, Aug. 23, 1839. He was educated at the high school and university of his native town. In 1861 he became assistant geologist in the national survey of Scotland; in 1867 was promoted to be a full geologist, and in 1869 was appointed a district surveyor. Besides many important scientific papers he is the author of *The Great Ice Age and its Relations to the Antiquity of Man* (1874; enlarged, 1876); and *Prehistoric Europe* (1881), a work treating of archæology as well as the pleistocene geology.

GENET, EDMOND CHARLES (1765–1836), a French diplomatist, was born at Versailles, Jan. 8, 1765. His family name was Genest, but after coming to the United States he was generally known as Genet. Though brought up at the French court, he held republican opinions. Appointed *charge d'affaires* at St. Petersburg, in April, 1789, he got into trouble, and was dismissed in July, 1792. In the following December he was appointed minister to the United States. On his arrival at Charleston, S. C., April 8, 1793, popular demonstrations were made in favor of the French republic. Still more enthusiastic was his reception at Philadelphia, May 16. But the government discreetly determined to avoid intermeddling in European affairs. It refused to make further alliance with France, and forbade Genet to grant letters of marque and military commissions, as he had already done. The ambassador fussed and fumed, appealed to the people, and endeavored to stir up Congress against the President. He went so far that, at Washington's request, he was recalled before the end of the year. So imprudent had Genet's conduct been that he preferred to remain in the United States, where he found some warm supporters. He married a daughter of Gov. George Clinton, of New York, in 1794, was naturalized, and proved a useful citizen. After the death of his first wife he married a daughter of Samuel Osgood. He took much interest in improvements in agriculture and the arts. He died at Schodack, Long Island, July 14, 1836.

GENEVA, an incorporated village of New York, in Ontario county, is on the north end of Seneca Lake, 50 miles W. of Syracuse and E. of Rochester. It is on the New York Central Railroad, and has also railroads to Ithaca, Lyons, and Corning. It has 6 hotels, 2 national banks, 1 other bank, 4 weekly newspapers, 11 churches, and 6 schools. Hobart College, an Episcopalian institution, is located here. There are 6 factories, 3 foundries, and several flouring-mills. The town is neat and picturesque; it is lighted with gas and electricity, and has water-works and 2 parks. The property is valued at $3,600,000, and the public debt is $13,000. It was settled in 1790 and incorporated in 1812. Its population in 1880 was 5878.

GENISTA, a genus of plants known as Broom in popular language, although that name covers what are now regarded as two separate genera, *Spartium* and *Genista*, both of the order Leguminosæ. The former in classification is distinguished chiefly by the filaments being all united in a simple tube, while they form two sets in *Genista* proper. In *Spartium* the legume is perfectly flat, while it is turgid in *Genista*, and there are some minor differences of interest to the critical botanist. The origin of the name *Genista* is uncertain. It is used by Pliny, who says the flowers are grateful to bees, and that the Greeks call it *Spartion*, but points out that it is distinct from the grass of that name, which we know now as "Esparto grass." The long and leafless branches of *Spartium junceum*, according to Gilbert, were commonly used in French and Spanish vineyards instead of twine for tying the vine, and in the similarity of uses may have originated the similarity of name. In fact, both the esparto grass and the *Spartium* broom furnish fibres now known as *esparto*.

The broom has a historic interest, as being the emblem of the house of Plantagenet, or "Planta-genista," of which King Henry II. was the first representative in England. Some authors incline to the belief that his father Geoffrey, Count of Anjou, was the first who bore the name, from the incident of his wearing a sprig of broom in his helmet during a battle. Another account is that another member of the family, long before, made a penitential voyage to the Holy Land, and used to lash himself for penance every evening with a bunch of broom. *Spartium junceum* seems to have been the *Genista* of the house of Plantagenet. The broom of Scotland is *Spartium sesparium*. The English broom is critically *Genista anglica*, a low, thorny bush, or *G. pilosa*, a low bush with hairy legumes, but probably the most common species in England, and the one which has become naturalized to a considerable extent in the north-eastern part of the United States, is *Genista tinctoria*, known popularly as "Dyers-green weed," and "wood-waxen," or "wood-waxen." A yellow color, prepared from the flowers, was once popular for dyeing wool, but was found of little service in dyeing cotton. Cattle seldom touch it; but it is said that, when cows from hunger are forced to eat it, the milk becomes intensely bitter. It is becoming a bad weed in New England pastures, from the fact that, being rejected by cattle, it is left to perfect seed and spread itself. Broom is used to a considerable extent in medicine. It has especially a reputation for good service in dropsy. (T. M.)

GEORGE, LAKE, one of the most beautiful of American lakes, is in the State of New York. It occupies the bottom of a valley lying between high ridges, and forming, for the principal part of its length of 32 miles, the boundary between Washington county on the E. S. E. side and Warren county on the W. N. W., extending southward into Warren county. The outlet, at the N. N. E. point, is in Essex county. Its elevation is 346 feet above tide-water. The greatest depth exceeds 400 feet. The lake receives several considerable brooks, but no large streams. Its outlet, a copious stream, makes a hurried descent of 99 feet in its course of 5 miles, flowing into Lake Champlain near the ruins of the historic Fort Ticonderoga. At the S. extremity of the lake is the village of Caldwell, and near the outlet is Baldwin, both of which places are reached by branch railways. The lake has 220 islands, some of which are mere rocks. On the shores there are many summer hotels, at most of which steamboats touch several times a day throughout the season. For the most part the shores are bold, rocky, and wooded, and without much cultivated land. After the village of Caldwell (the shire town of Warren county) the principal places on the shores are Bolton and Hague.

Lake George was so named in 1755 by Sir William Johnson, in honor of King George II. The Jesuit missionary Jaques visited it in 1607 and called it Lac du St. Sacrament. The old Indian name is said to be Andia-to-roc-te. The name Lake Horicon appears to have been invented by J. Fenimore Cooper. (See introduction to *The Last of the Mohicans.*) But some writers will have it that Horicon means "the smile of the Great Spirit;" and others translate it "silvery water." The curious identification of this name with that of Oregon appears to be traceable to no higher authority than that of Rafinesque, who translates it "hollow."

During the colonial period the region of this lake was the scene of many important events. The ruins of Fort Wm. Henry (built in 1755 by Sir Wm. Johnson) are at the S. end of the lake, and those of Fort George (built in 1759 by Amherst) are a mile distant. The important battle of Lake George, between the French and Algonkins on the one side and the English and the Iroquois on the other, took place Sept. 8, 1755. In March, 1757, Vaudreuil attempted to take Fort Wm. Henry by surprise, but failed in the attempt. In August following it capitulated to Montcalm, after which his Indian allies fell upon the retreating English garrison and murdered large numbers. Montcalm then destroyed the fort. At Sabbath Day Point Putnam, in 1756, repulsed the French. Lord Howe lost his life (1758) in a skirmish near the N. end of the lake. (C. W. G.)

GEORGE, ENOCH (1768–1828), an American Methodist bishop, was born in Lancaster co., Va., in 1768. He entered the ministry as an itinerant in

North Carolina in 1790, was made presiding elder in the Charleston district, S. C., in 1796. Here his labors resulted in a marked revival of religion. In 1801, his health having failed, he opened a school at Winchester, Va. In 1816 he was chosen a bishop and discharged his duties with great zeal and earnestness. He died at Staunton, Va., Aug. 23, 1828.

GEORGE, Henry, an American journalist and social economist, was born in Philadelphia, Sept. 2, 1839. Learning the printer's trade he went to California, where, after some experience in mining, he settled down as a journalist. In 1871 he joined with two others in founding the *San Francisco Post*, but his mind was now occupied with the social problem of the distribution of wealth. His first economic publication was *Our Land and Land Policy* (1871). Four years later he retired from editorial work, but he has since continued to write for the newspapers. His principal work, *Progress and Poverty* (1879), attracted considerable attention immediately upon its publication and still more when republished in Europe. It has been translated into several languages, and has been criticised by political economists and social philosophers of all schools. Its main doctrine is that "nothing short of making land common property can permanently relieve poverty and check the tendency of wages to the starvation point." The agitation of the land question in Ireland led him to publish a little book on *The Irish Land Question* (1880), but his views were not approved in the main by the Irish Nationalists. In 1881 Mr. George went to Ireland as a newspaper correspondent to examine the actual condition of the peasantry, and was imprisoned for a time as a suspect, but was afterwards released with ample apologies. He visited England in 1883 and lectured in the principal cities, advocating the theory advanced in his book and causing controversy among the politicians as well as social philosophers. A number of essays treating further of his doctrines were gathered into a volume called *Social Problems* (1883).

See Vol. X. p. 390 Am. ed. (p. 434 Edin. ed.).

GEORGIA, a Southern State of the American Union, lying on the Atlantic Ocean, between South Carolina and Florida. It lies between the meridians of 80° 48′ and 85° 38′ W. long. from Greenwich and the parallels of 30° 21′ 39″ and 35° N. lat. Its area is 59,475 square miles, or 38,064,000 acres, of which 1495 square miles are reckoned as water surface, leaving 57,980 square miles of land area, equal to 37,107,200 acres. Its extreme length from north to south is 320 miles and its extreme breadth from east to west 254 miles. For the purpose of indicating the principal physical features of the State geographers have considered it under five divisions—the Sea Islands, the Swamp Region, the Pine-barren Belt, Middle Georgia, and Cherokee Georgia. A more practical and popular division is, however, that of: the Mountain Region, or Upper Georgia; the Hill Country, or Middle Georgia; and the Low Country, or Lower Georgia.

Upper Georgia has an area of about 10,000 square miles, embracing nearly all the mountains and much hill country. In this region are two distinct chains of mountains—the Blue Ridge, in the north-east, with its lines of separate peaks, of which the Rabun Bald is the highest, 4698 feet above the sea; and the Cumberland Range, a longer and more connected chain of mountains than the Blue Ridge, which enters the State between Rabun and Towns counties and cuts off Towns, Union, and Fannin counties. In this chain are Tray Mountain, 4437 feet; Mount Enotah (Brasstown Bald), 4802 feet; and Blood Mountain, 4460 feet. West and south-west of Fannin county, Cherokee Georgia abounds in mountains and ridges belonging to the western chain of the Appalachian range, though none of their summits are so high as those we have named.

Middle Georgia—the Hill Country—lies between the heads of navigation of the principal rivers of the State and the elevation of 1000 or 1100 feet, and has an area of about 15,000 square miles. The foot-hills, which begin in Middle Georgia, run in nearly parallel ranges and cover a breadth of almost 150 miles, with fertile valleys between them. The southern border of Middle Georgia is a table-land, gradually ascending and reaching in Baldwin county an elevation of 575 feet above the sea.

Lower Georgia—the Low Country—lies below the line joining the heads of navigation of the rivers, and is much the larger part of the State, having an area of nearly 35,000 square miles. It is below the level of 300 feet above the sea.

Rivers.—There are three distinct drainage basins and river systems in Georgia—the *Atlantic basin*, which receives the waters of the Savannah, the Ogeechee, the Altamaha, with its affluents, the Ohoopee, the Oconee, and the Ocmulgee, the Satilla, and the St. Mary's, with their respective tributaries; the *Gulf basin*, which receives the waters of the Chattahoochee, with its great tributary, the Flint, the Ocklockonee, the Suwannee, and several smaller streams, and discharges them into the Mexican Gulf, and the upper waters of the Coosa and its affluents, which also flow into the Gulf; and, third, in the extreme north-west and west, a part of the *Tennessee basin*, into which flow the upper waters of the Tennessee and its affluents, the Hiawassee, the Tacoah, the Notley, the Ocoree, the Catoosa, and Chickamauga Creek. These waters find their way down the Tennessee to the Ohio, and thence to the Mississippi.

The Atlantic and Gulf water-sheds together drain about three-fourths of the State, or about 44,000 square miles. Of this the Coosa, an Alabama river, and its tributaries in Georgia drain 6020 square miles. The Tennessee basin drains somewhat more than 1000 square miles. Of these rivers the Savannah, which has a length of 450 miles, is navigable for 230 miles; the Chattahoochee, which, after its junction with the Flint at the Florida line, is called the Appalachicola, is 550 miles long, is navigable for 350 miles, and the Flint for 300. The Ogeechee, Ocmulgee, Oconee, Satilla, St. Mary's, and the Suwannee are navigable for a considerable distance in Georgia, the total navigable waters of the State exceeding 1500 miles. The sea-coast, extending in a direct line from the St. Mary's to the mouth of the Savannah, is bordered with islands, between which and the mainland are the following sounds, connected with the ocean by numerous inlets: St. Andrew's, St. Simon's, Altamaha, Doboy, Sapelo, St. Catharine's, and Ossabaw Sounds. The whole coast line formed by the islands and sounds is said to be about 480 miles. The islands have a fertile, alluvial soil, and yield large crops of rice and Sea-island cotton.

There are many cataracts and waterfalls of great beauty in Northern and Middle Georgia, the most celebrated of which are Toccoa Falls and the Tallulah Cataracts; Estatoia Falls, Hiawassee Falls, Amacolola Falls, the Stekoa Falls, the Falls of the Towalaga, the Caledonia Cascade and Oceana Falls, Turner's Point and Indian Arrow Rapids. Most of these are in the extreme northern part of the State.

Geology and Mineralogy.—The geological formations represented in Georgia include almost every known geologic period. We have here, though not in regular succession, the Palæozoic period, represented by the Primordial, Silurian, and Devonian groups and the Carboniferous era; the Mesozoic period, by the Triassic and Cretaceous; the Neozoic, or Tertiary, by the Eocene, Miocene, and Pliocene; and the Quaternary, or Southern drift, by irregular strata of sands and clays, and the still more recent extensive deposits of alluvium. There is also a broad area of metamorphic and crystalline rocks in the middle and northern portions of the State, indicating at some time in the past volcanic action. The rocks of this section are feldspathic granites and gneisses, hornblendic gneisses and schists, mica schists, sandstones, soapstones, and other rocks of the Appalachian region. They are all interpenetrated and crossed at frequent intervals by quartz veins, large and small, and by numerous trap-dikes. Both the veins and dikes are somewhat disintegrated and form part of the local soils. This is the mineral region of the State, and gold and silver are both found in it in considerable quantities. North-west of this metamorphic region we come to the rocks of the Palæozoic period, the Primordial rocks, including the early sandstones, shales, and limestones, followed in turn by the Silurian and Devonian groups, the former extending from the Savannah River above Augusta, through the north-western counties, to the foot of Dugdown Mountain, in Haralson county, on the west line of the State, with occasional outcrops of Devonian. Beyond these, in the north-west corner of the State, the coal measures belonging to the great coal deposit, which occupies Central and North-eastern Alabama, yield an excellent quality of bituminous coal. A very short distance from these coal-beds, in Bartow and Cherokee counties, immense deposits of iron ore are found at the junction of the limestone and Metamorphic rocks, while still nearer, Shinbone Mountain, which runs parallel with Lookout Mountain for forty miles, is simply a mass of fossiliferous iron ore, distant only a mile from the coal-beds. Iron can be produced here cheaper than anywhere else in the United States, and of excellent quality, and many smelting furnaces have been erected and are kept busy.

The triassic formation includes the trap-dikes and clay slates of the metamorphic region and its border. The largest trap-dike in the State lies west of the granite region. The cretaceous group occupies but a small area in the western part of the State, and forms the eastern termination of the chalk beds, which extend from North-eastern Mississippi through Middle Alabama into Georgia. The tertiary beds underlie the most of Southern Georgia and are covered largely by the quaternary deposits of sands and clays on the south and east. The Eocene is most fully represented, but the Miocene and Pliocene also occur on the south-east. The Claiborne, Jackson, and Vicksburg groups of the Eocene are all present, the last named extending northward from Florida. The quaternary (or Southern drift) formation consists of irregular deposits of sands, clays, and ferruginous sandstones over the older strata. These deposits in Georgia are confined to the southern half of the State. The sands are white and deep, and beneath them are variegated clays, mostly plastic.

Besides the veins and lodes of gold and silver in the metamorphic region, and the iron and coal of the carboniferous deposits in the north-west, there are veins of copper ore in Gilmer county, and considerable lead is found with the silver in the argentiferous galena. Gold exists in almost every county north of the central line of the State, but is most plentiful in Cherokee, Carroll, Cobb, and Lumpkin counties. It was first discovered in Habersham county, in 1831. A branch mint was established at Dahlonega, Lumpkin county, in 1837, and in the next 24 years coined $6,121,919, mostly of Georgia gold. It was discontinued in 1861, and the buildings have been given by the government to the North Georgia Agricultural College. Hydraulic mining is now practised extensively in the State in working the placer deposits of free gold. Silver is combined with the gold, and occurs also with sulphuret of lead in the galena ores. The usual minerals found with gold and silver—antimony, zinc, manganese, titanium, tellurium, and graphite—are found here, but are not separated. There are several quarries of excellent marble, one of statuary marble in Cherokee county, building limestone, granite, marls, and burrstones; and gypsum, syenite, talc, soapstone, asbestos, slate, tripoli, fluor-spar, barytes, hydraulic cement of excellent quality and very white in color in Bartow county, and petroleum of good quality are among the mineral products of economic value; while beryls, garnets, agates, amethysts, and perhaps diamonds, have been found in the State. Fossils are numerous and many of them of great importance. Among them are skeletons of the mastodon, megatherium, mylodon, two species of fossil elephant, an extinct ox, and many species of fossil turtles and mollusks. There are many mineral springs in the State, those in the northern counties being mostly chalybeate, while those in the central portion are usually sulphurous. The Indian Springs, in the northern part of Forsyth county, have a deservedly high reputation.

Vegetation.—From the great variety of its soils, almost every production of the temperate and subtropical regions may be successfully cultivated in some part of the State. Its flora and sylva include a large number of genera and species. The forest-trees of the State include 20 species of oak, differing from each other in grain, leaf, texture, strength, and durability; one of them, the live-oak, is the finest ship-timber in the world, and that found in the vicinity of Brunswick is the most valuable grown in the United States. It is an evergreen. There are six species of hickory, and five or six species of pine, but the Georgia yellow- or pitch-pine is the most valuable. The other principal forest-trees are the ash, chestnut, beech, sycamore, dogwood, tulip-tree or American poplar, elm, cottonwood, magnolia, bay, maple (several species), fir, spruce, birch, persimmon, cedar, cypress, black and sweet gum, sassafras, chinquapin, white and black mulberry, haw, black walnut, etc., etc.

The grasses are numerous, but two of them, though valuable for many purposes, are greatly hated and feared by the cotton- and rice-planters. These are the Bermuda grass and the wire grass (*Poa compressa*). (See FORAGE CROPS.)

The *flora* of Georgia includes many beautiful flowering plants, among which the broad-leaved *Kalmia*, the *Magnolia grandiflora*, the dogwood, the azalea, and the wild lilies and roses are most conspicuous.

Climate and Health.—Georgia has three distinct climates, governed in part by the latitude and in part by the altitude above the sea. Southern and South-eastern Georgia is low, with a rich alluvial soil and extensive swamps; it is sickly during the hot season; malarial, bilious, and typhoid fevers then prevail. Those who are thoroughly acclimated do not find the climate objectionable; but it is dangerous to those from higher and cooler lands. This region has a winter mean temperature of from 48° to 51°, the minimum in the winter months being rarely below 32°. In the exceptional year, 1885–86, it sank to 18°, a lower point than had been reached for fifty years. The maximum temperature of the year is about 95°, but the heat is constant and continued for six months. The summer mean is from 79° to 81°. The rainfall taking the years together is about 57 inches, December and January being the driest months.

In Middle Georgia the rainfall is less, about 41 inches being the average. The driest months are June and September. The yearly temperature ranges from 6° to 102°, though occasionally in very severe winters the mercury sinks to zero. The range is great, but the mean range is much less, the winter mean being about 41°, and the summer 73°. The nights in summer are cool and invigorating. Snow frequently falls, but melts almost as rapidly as it touches the ground.

North-eastern and North-western Georgia have a more varied surface, and a climate as varied as the land. The annual mean temperature ranges from 50° on the highest lands to 60°.3 on those of more moderate elevation. The rainfall ranges from 57 inches to 61. The maximum during the summer months does not usually exceed 95°, and the mean of those months is about 75°; the winter mean is 39°.05, ranging from 45° at Marietta to about 36° at Ringgold; and the winter minimum, ordinarily about 3°, in very severe seasons has been known to drop to —4°. The range is less than in Middle Georgia. Snow falls to a depth of from two to four inches, but usually remains but a short time. The climate is healthy, the winters generally delightful, and many points, not of the highest elevation, are excellent as winter resorts. There is sufficient cold to prevent the enervating effect which is experienced in lower lands. The average mean annual temperature for the whole State is 65°, and the average annual rainfall from 47 to 50 inches.

Agriculture; Crops.—The crops vary with the soil, elevation, and temperature. In the low flatlands, the orange, lemon, banana, olive, and other semi-tropical fruits come to perfection, though at rare intervals affected by frosts. The quality of these fruits is thought to be inferior to those of Central Florida, and they do not command quite so high a price. The principal crops are rice, sugar-cane, Sea-island and some short-staple cotton, sweet potatoes, and a moderate quantity of corn. In Southern Georgia considerable cotton is grown, and rich and succulent grasses, both for pasture and hay. Stock and swine are pastured in the pine woods. Middle Georgia is a fine fruit-region. The peach-tree is hardier, subject to fewer diseases, and yields more abundantly than in any other State. More attention is now given than formerly to the improvement of the quality of the fruit. Apples and pears, especially of the early varieties, are abundant, and many of the seedlings prove excellent. The small fruits are less successful, though the native southern grapes, the Herbemont, Scuppernong, post-oak, etc., do well. Melons, tomatoes, and market vegetables are largely cultivated, and shipped early to Northern ports. Cotton is the staple crop in this section, but Indian corn, wheat, and clover are also important crops, and some rye, oats, and barley are grown. Tobacco, sorghum, and peanuts, or goobers, as they are generally called, are becoming popular crops. The sweet potato is also cultivated largely and exported. North-eastern Georgia is mountainous, but with rich soil in the creek and river lands, where there is heavy timber, and good grass and grain. North-western Georgia is a blue limestone region, with a rich, fertile soil in the river and valley lands. Its crops are wheat, Indian corn, clover, and other grasses; potatoes, apples, pears, peaches, and other fruits; and in the river valleys, where there is sand, cotton. Fruits are from four to five weeks earlier than at the North.

South-western Georgia is the great cotton region of the State, and raises sugar-cane and rice in the bottom lands. Sweet potatoes are grown in great quantities by the negroes, and attempts have been made in tea-culture. This part of the State has a sickly climate in summer.

The returns of 1884 show that the cotton crop reached 760,000 bales, being 58,160 bales larger than the great crop of 1860, but 54,000 bales less than the crop of 1880, and 182,000 bales less than that of 1882, though the bale is steadily growing larger, and now averages at least 485 pounds. The product per acre varies in different sections of the State, being largest on the poorer lands, in consequence of greater care and more abundant fertilization. The statistics of the Sea-island cotton are not given separately. The cotton crop does not average nearly as much as it should, through the carelessness of many of the growers. Of rice production in the State, the statistics of 1880 show a yield of somewhat more than 25,400,000 pounds, about half the crop before the war, but the crop is said to be increasing. Of Indian corn, 28,765,700 bushels were reported in 1884; about an average crop, though showing only 10.6 bushels to the acre. Wheat is never a large crop in Georgia; in 1883 the yield was reported as 2,574,900 bushels; in 1884 it was a little more than 3,500,000 bushels, but the average yield of the State was only 7 bushels to the acre. Oats yielded, in 1884, 6,385,000 bushels, an average yield of 12.02 bushels to the acre. The crop of sugar-cane was 601 hogsheads of sugar and 1,565,784 gallons of molasses in 1880; and of sorghum, 981,152 gallons; of sweet potatoes, 4,397,778 bushels; of hay, 14,469 tons. This product has largely increased.

The numbers and values of farm animals in 1885 were as follows: 105,776 horses, valued at $8,736,040; 143,843 mules, valued at $13,754,268; 344,458 milch cows, valued at $6,028,015; 610,811 oxen and other cattle, valued at $6,566,218; 532,547 sheep, valued at $793,495; 1,597,937 hogs, valued at $5,528,862. Total values, $41,406,898.

Manufactures.—Both manufactures and mining have made a great advance since 1880. In that year the census statistics were: Capital employed, $20,672,410; number of hands employed, 24,875; wages paid, $5,266,152; material used, $24,143,939; annual product, $36,440,948. In 1884 the capital employed was $38,841,822, and the product about $70,000,000. The largest single industry is probably now that of cotton goods, which employs 10,000 hands and $13,000,000 capital, and turns out annually from its 7,834 looms and its more than 340,000 spindles, goods to the amount of $25,000,000, using over 100,000 bales of cotton in the work. There were also, in 1884, 32 woollen-mills, producing over $800,000 of goods; flouring-mills, producing $9,703,898 of flour and meal. The iron and steel interest in the north-western part of the State is nearly equal to the cotton manufacture. Recent statistics are wanting, but the annual product must exceed $20,000,000.

The manufacture of lumber, timber, and naval stores may be reckoned among the great industries of the State. The constantly increasing demand for Georgia yellow-pine lumber keeps hundreds of saw-mills constantly employed, and the market for live-oak and other hard-wood timber is also enlarging with each year. In 1884 the shipment of lumber exceeded 200,000,000 feet, and the timber shipments were also very large. The annual product of lumber and timber in that year was estimated at $7,000,000. Naval stores—tar, pitch, resin, and spirits of turpentine—are produced in great quantities in the pine forests. The shipments of naval stores in 1885 from the ports of Savannah and Brunswick exceeded $3,000,000, of which about $750,000 went to foreign countries. The production has more than doubled since 1880. The manufacture of cotton-seed oil, of tobacco, of iron, cast and wrought, of machinery, paper, etc., etc., make up a grand total, as we have stated, of more than $70,000,000.

Coal-mining, as well as mining for the precious metals, has received a great impulse since 1880, and the coals of North-western Georgia are in large demand for smelting purposes. The present amount of mining products is not known.

Fisheries.—There are extensive and profitable shad-fisheries on the Savannah and Ogeechee rivers, as well as in some of the sounds, and the shad from these are among the earliest brought into Northern markets. There are also fisheries for Spanish mackerel, sea-trout, pompano, grouper, and red snapper, and for green turtle at Brunswick, St. Mary's, etc.

Railroads.—The mileage of railroads in the State in 1884 was 2940 miles, of which 65.5 miles were constructed in 1883. A railway commission, consisting of three members, appointed by the governor, with the advice and consent of the senate, supervise and control all railroad matters in the State. The Central Railroad of Georgia, with its leased lines, is the most potent railway organization in the State. Besides its own lines of 312 miles, it leases 13 other railroads, some of them of great length; it also owns and controls the Ocean Steamship Company, of Savannah. The Savannah, Florida, and Western Railroad has 236 miles of its main line in Georgia, as well as several branches, and owns, leases, and controls in Georgia and Florida over 1000 miles. Other important roads are: the Brunswick and Western, 171 miles long; the Macon and Brunswick, 187 miles long; the Georgia Railroad, uniting Augusta and Atlanta; the Western and Atlantic, the property of the State; the Southwestern; the Marietta and North Georgia, and the Atlanta and West Point. Other roads, mostly belonging to corporations out of the State, are: the Richmond and Danville, with its branches; Alabama Great Southern, East Tennessee, and Georgia; Atlanta and Charlotte Air-line; Georgia Pacific, and Augusta and Knoxville.

There are three canals in the State, but they have a total length of only 37 miles. They are all large enough to admit the passage of steamers, and connect the Savannah and Ogeechee, Brunswick and the Altamaha, and Augusta, above and below the falls of the Savannah.

Ocean Steamship Lines.—The Ocean Steamship line and the Philadelphia line, both owned by the Central Railroad of Georgia, ply between New York and Philadelphia and Savannah. The Boston and Savannah Steamship Company, and the Merchants' and Miners' Transportation Company, of Baltimore, also make Savannah their southern terminus. Several of the West India and New Orleans lines also touch at Savannah, both in going and returning.

Commerce.—The foreign commerce of Georgia is large. She has three ports of entry, viz.: Brunswick, Savannah, and St. Mary's, though the last named is mostly occupied with internal commerce, the coasting trade, and the fisheries. In the year ending June 30, 1885, the exports were $22,142,154, of which Savannah shipped $20,571,446, nineteen-twentieths of it being cotton. The imports for the same year were $654,159, of which $652,625 were brought to Savannah. The coasting trade is very large, and here Brunswick and St. Mary's do much more business. Timber and lumber, especially Georgia pine and live-oak timber, Sea-island and other cotton, early vegetables, tomatoes, Irish and sweet potatoes, fruits large and small, shad, Spanish mackerel and other fish, and naval stores, form the bulk of the shipments. This internal commerce is known to be more than double that to and from foreign ports. There were in the year ending June 30, 1885, 502 vessels which entered these ports from foreign countries, having an aggregate tonnage of 283,867 tons; of these only 27 were American, of 11,365 tons burthen; 569 vessels cleared with 322,081 tons burthen, of which 66 were American, of 27,912 tons. Fifty ocean steamers entered and 63 cleared from Savannah. The total mercantile marine of Georgia in 1885, registered, enrolled, and licensed, was 133 vessels, of 35,830.75 tons, of which 51 were steamers with a tonnage of 24,023.85 tons.

Finances.—The assessed valuation of real and personal estate, which in 1880 was very slightly under $240,000,000, now exceeds $300,000,000, and the real value is probably more than $375,000,000. The recognized bonded indebtedness of the State Oct. 1, 1884, was $8,704,635, and the interest for 1885 was $582,121. The total tax levied in 1884 was $1,165,885.41, and there was collected of this $1,156,244.67. The debt is being gradually reduced by a sinking fund. The current receipts from taxes, licenses, fines, and penalties, exceed the expenditures.

Education.—The latest public school enrolment of children of school age in Georgia gave the total number as 494,411. Of these, 322,144 were enrolled as belonging to the public and private schools, and the number in actual daily average attendance was 188,371. Of those enrolled for the public schools, 175,668 were white and 111,743 colored. About 35,000 were in private schools. The whole number of public schools was 6560; there were about 960 private schools. The whole number of public school teachers was a little more than 6600, and of private school teachers 975. The amount distributed to the schools in 1884, derived from the rental of the State railroad, from dividends of Georgia Railroad, and various taxes, was $488,347. The negroes pay, directly and indirectly, about one-half of this sum. No county is entitled to a share of the fund unless its schools are in operation at least three months of the year. The Peabody fund contributes about $6000 yearly to specified schools, and the John F. Slater fund contributes $3000 or more to the freedmen's schools. Atlanta, Savannah, Augusta, and Macon have excellent high and graded schools, under special city organizations. There are many schools of secondary instruction, academies and seminaries of respectable and some of them of high grade. There are also seven or eight schools of high grade for the education of colored people of both sexes, for teachers and preachers. These are maintained by associations of the different religious denominations; some of them are endowed; they are largely attended, and are doing a good work. There is a State University at Athens, with branches at Dahlonega, Milledgeville, Cuthbert, and Thomasville. The branch at Dahlonega, also called the North Georgia Agricultural College, gives a full scientific course and is empowered to confer degrees. There is also the Mercer University at Macon, under the control of the Baptists. Both these have law and scientific and normal departments. The State University has also medical and agricultural departments, and the Mercer University a school of theology. The number of students in all departments of the State University and its branches was 1097 in 1884. Mercer University has in its several departments a full attendance of students. Emory College, at Oxford, under the control of the Methodist Church South, is a large institution, and has a scientific course in addition to the regular college curriculum. There are also Bowden College, at Bowdon, non-sectarian, and Pio Nono College, at Macon, a Roman Catholic institution. There are six collegiate institutions for freedmen, two of them, Atlanta University and Clark University, both at Atlanta, having the chartered powers of universities. There are 4 or 5 theological schools of the different denominations; 4 medical colleges, 3 regular and 1 eclectic; 2 law schools, connected with the universities; and 14 institutions, some of them liberally endowed, for the superior instruction of women. There are no separate normal schools except for freedmen, but normal instruction is given in some of the colleges, and normal institutes are held in different parts of the State. There is a school for deaf-mutes at Cave Spring, founded in 1847, and one for the blind at Macon, established in 1852. The State has but one insane hospital, situated near Milledgeville, with accommodations for about 1500 patients.

The Georgia penitentiary system is peculiar, the convicts, to the number of nearly 1400, being leased for twenty years to three companies of contractors, who employ them in building railroads, in mines, and at any labor where they can be used.

Churches.—There were in 1884 about 3600 churches of all denominations in the State; the Baptists having a membership of 255,067 in the regular Baptist churches, of which more than one-half were negroes; the Disciples, also Baptistic in their ordinances, had about 7000 members; the Methodists came next, divided into Methodist Episcopal Church South, African M. E. Church, Methodist Episcopal Church North, and Methodist Protestant, having in all a membership of 179,850, of whom about one-half were negroes; the Presbyterians had 8228 members, mostly whites; the Protestant Episcopal Church 4569 members, nearly all white; the Congregationalists 1257, and other minor denominations somewhat more than 2000 members in all. The Jewish population is said to be about 7000, and the Roman Catholic is 25,000. These statistics seem to indicate about 1,500,000 as the adherent religious population of the State.

The following table shows the population of Georgia, classified at each enumeration from 1790 to 1880, the rates of growth, and the proportions of males, females, white, free colored, and slaves before the emancipation proclamation, etc. The total population in 1885 was estimated at 1,750,000.

There are 137 counties in the State, varying in area from 110 to 1160 square miles, in population from 2161 to 46,126, and in valuation from less than $75,000 to $30,736,165.

	Total Population.	Males.	Females.	White.	Free Colored.	Slaves.	Natives.	Foreigners.	Density.	Ratio of increase.	Number of families.	Number of dwellings.	Persons in dwelling.	Of military age.	Of voting age.
1790	82,548	....	....	52,866	398	29,264	....	....	1.4						
1800	162,686	....	....	102,261	1,019	59,406	....	....	2.8	97.0					
1810	252,433	....	....	145,414	1,801	105,218	....	....	4.3	55.1					
1820	340,985	175,170	165,815	189,566	1,763	149,656	....	....	5.8	35.0					
1830	516,823	263,366	253,457	296,806	2,486	217,531	....	....	8.7	51.5					
1840	691,392	351,243	340,149	407,695	2,753	280,944	....	....	11.7	33.7					
1850	906,185	456,465	449,720	521,572	2,931	381,682	514,566	6,452	15.4	31.0	91,666	91,206	5.75	....	112,110
1860	1,057,286	41,128	36,619	591,550	3,500	462,198	1,045,615	11,671	17.9	16.6	109,919	109,069	5.46	....	198,624
1870	1,184,109	311,171	327,755	638,926	545,142	None.	1,172,982	11,127	20.0	11.9	237,850	236,436	5.01	202,573	237,640
1880	1,542,180	403,774	413,162	816,906	725,135	None.	1,531,616	10,564	26.1	30.2	303,060	289,474	5.33	275,815	321,438

Principal Cities and Towns.—ATLANTA (the capital) had, in 1880, 37,409 inhabitants; it is a great railroad centre, a thriving, enterprising city, with many manufactories. Savannah, the largest sea-port, also the terminus of several railway lines, had 30,709; Augusta, a fine cotton-market on the Savannah River, 21,891; Macon, noted for its educational institutions, 12,749; Columbus, also a large cotton-market, 10,123; Athens, the seat of the State University, 6099; Milledgeville, the former capital, had 3800.

Recent History.—The history of Georgia in the last few years has been one of material progress. Gov. Colquitt, who held the gubernatorial office from 1877 to 1882, was re-elected to a second term, and at its close elected U. S. Senator. Alexander H. Stephens, who succeeded him in December, 1882, and who was the most eminent statesman the State has produced, only lived to enjoy his honors three months, dying in March, 1883. J. S. Boynton was acting governor till November, 1883, when Henry D. McDaniel was elected for a term expiring December, 1886.

The National Exposition of cotton and other products of the Southern States, at Atlanta, in the autumn of 1881, gave a very powerful impulse to the agricultural and manufacturing interests of the State, which still continues, and has been heightened by other Southern expositions which have followed. Since 1880 the State has lost by death several of its eminent political leaders. Among these we may name besides Gov. Stephens, Ex-Govs. C. J. Jenkins and Herschel V. Johnson, Benjamin H. Hill, and Robert Toombs. (L. P. B.)

GERANIUM, a genus of plants, the type of the order *Geraniaceæ*. As usually defined the order contains but four genera, *Erodium*, *Geranium*, *Monsonia*, and *Pelargonium*, but they are represented by more than 500 species, mostly belonging to the genus *Pelargonium*. They are very near the orders represented by the *Oxalis*, *Tropæolum*, and *Impatiens*, and Lindley observes that "the long beak-like torus around which the carpels are arranged, and the presence of membraneous stipules at joints which are usually tumid, are the true marks of this order." Dr. Gray, however, unites the allies cited all under *Geraniaceæ*, making them represent sections only. *Pelargonium* was divided from the original *Geranium*, as the South African species became better known, on account of a lesser number of stamens, more irregular petals, with a calyx spur (free in *Tropæolum*) united with the pedicle. Many of the true *Pelargoniums* still go under their original name of geraniums in gardens. What was known as the "Scarlet Geranium" a quarter of a century ago has been renamed "Zonal Pelargonium" from the dark, horseshoe-like zone which appears on the leaves of many of the varieties. The skill of the florist has now added a great many colors to the original scarlet, and has evolved double flowers of various shades; and, as the plants are continuous bloomers, they are among the most popular of cultivated flowers. They are adapted equally for filling garden-beds during the summer, and affording a supply of flowers for windows and green-houses during the winter season. New races of the African species are continually appearing, and tax the vocabulary of the florist to find suitable names for them.

Most of the true geraniums, as represented by those which have numerous stamens and regular flowers, are natives of cooler climates, and some of them are among the most beautiful of those plants cultivated in the flower-borders of England and America. A number of species are found in the mountainous regions of South America, Asia, and Europe, and in high northern latitudes. England alone has thirteen species, of which one, *G. Robertianum*, is also indigenous to the eastern portion of the United States, though several others have been introduced and are common as harmless weeds. There are among indigenous species two others in the Eastern United States, *G. maculatum*, a very pretty ornament of the woods, and *G. Carolinianum*, partial to exposed places, and often found in rich waste or cultivated ground. *G. Fremontiana*, *Richardsonii*, and *G. Cæspitosum* are found in the Rocky Mountains. Besides the last two and *G. Carolinianum*, *G. incisum* is found on the Pacific coast. Representatives of the genus *Erodium* have also become naturalized in Europe, and one species, *Erodium cicutarium*, thrives so well in California that it has become one of the most esteemed forage-plants of that region, and is popularly known as "Alfilaria" (*Sp. alfilerilla*). Some of the South African species of *Pelargonium* have edible roots, and one in Tasmania is known as the "Parsnep," but their edible character is beneath all proportion to the number of species which the order presents. In medicine, however, *Geranium maculatum* has a fair reputation, especially where powerful astringents are desirable. The roots are said to have considerably more tannin than kino possesses.

Geranium Robertianum is the "Herb Robert" of Europe, the origin of which name is lost in oblivion. Of various surmises Dr. Prior inclines to the one suggested by Adelung that it was so called from Robert, Duke of Normandy, "for whom was written the celebrated medical treatise of the middle ages, *Regimen Sanitatis Salernitanum*." It has, however, been known from early times as "Saint Robert's herb." All the botanical names have been suggested by the beak-like prolongation on which the fruit is borne; *Erodium* from the Greek *Erodios*, a heron; *Geranium*, from *Geranos*, a crane; and *Pelargonium*, from *Pelargos*, a stork. (T. M.)

See Vol. X. p. 390 Am. ed. (p. 447 Edin. ed.).

GERMANY. The history of the German Empire since 1879 is essentially a history of economical and social politics. The internal structure of the empire in its most important relations had been determined, the constitution established, the army and navy organized, the autonomy of the several states of the confederation provided for, a uniform system of coin, weights, and measures, as well as a common administration of justice and a common system of banking, introduced. The next duty was to adjust and regulate the common institutions. During the erection of those foundation-pillars of the constitution the government and the Parliament had for the most part acted in unbroken harmony. The principal party of the imperial diet was the Moderate Liberal, who aimed at the promotion of national power and greatness at least as much as at the development of liberty, and thought to strengthen the new empire most effectually by supporting the policy of Prince Bismarck, to whose genius the country mainly owed its unity. That party, joined with the less numerous Conservative party, who followed Bismarck in every measure, composed the majority in the imperial diet, and the whole legislation of the empire until 1878 bears the stamp of that Liberal-Conservative alliance. The opposition, composed of the Catholic Centre on the one hand and the more radical Liberals (Progressists), together with a small number of Socialists on the other hand, proved ineffectual against the union of the Moderate Liberals with the Conservatives.

This state of things underwent an important change when the internal arrangements of the work began to be carried out in detail. Bismarck was convinced that before all things else the financial and custom laws of the empire needed a change. The universal depression of trade, prevailing not only in Germany but also in the other European countries for several years, had revived in the public mind the old and almost forgotten controversy about free-trade and protection. To the government the unsatisfactory state of things became sensible mainly through the deterioration of finances. The indemnity paid by France had made in Germany a great reserve of coin, by means of which it succeeded in substituting the gold-standard for the previously existing silver-standard, and in redeeming loans in the several states. Capital, becoming thereby free, did not fail to stimulate the spirit of enterprise and speculation. Especially railway building was carried on with excessive rapidity. Further, a good part of the means obtained by the indemnity was employed in the construction of military lines, in completing the fortresses, and in other measures of national defence. All this caused a great enhancement of the supply of industrial products, and foreign countries, in particular England, hastened to take advantage of that condition of affairs. Thus it happened that the balance of trade soon turned against Germany, and the billions of the French indemnity, which had diffused all over the country an illusion of inexhaustible wealth, and arrayed especially the finances both of the empire and of the several states in the brightest light, gradually disappeared. Deficits took the place of surpluses, or at least the time when this must happen was seen approaching. At the same time the Free-trade party, whose power in the legislatures and in the administration seemed till now unshaken, proceeded unscrupulously to carry out their principles. The chancellor himself, like the whole conservative party to which he belonged, had once been a partisan of free-trade theories, and a few years before had proclaimed as his plan to reduce all customs to a few profitable financial duties. Indeed, the government of the empire, whose economical policy was almost exclusively guided by Mr. Delbrück, proceeded in the abolition of the existing moderate protective duties even more vehemently than the free-traders of the imperial diet wished, and the total repeal of the duties on iron in 1876 was the work of the government. But this very measure, executed in a time of depression in the iron trade, made the cup overflow. Nothing strengthened the resistance to the tendencies of free-trade among the industrial classes more than that measure. The iron manufacturers were thus roused to the necessity of a conflict; with them the textile manufacturers formed a close connection, and hence arose an agitation against the policy of free-trade, which rapidly spread through the people. The evident distress of trade did not escape the watchful eye of the chancellor. Heretofore he had cared little for economical policy, leaving it confidently and entirely to such men as Delbrück and Camphausen. But now he took the reins himself. The close connection of the commercial depression with the deterioration of the finances gave him the start; and the argument of the protectionists, based on the rapid draining in a few years of the great resources which Germany had received at the establishment of the new empire, seems to have made a strong impression on him. His abandonment of the free-trade policy was decided in 1878, and he delayed not a moment to turn another way. A commission was appointed to inquire into the questions of tariff as regards both the financial and protective effects.

With Prince Bismarck the paramount question was to prevent financial decline. This he sought to attain through combination of a tariff-reform with a reform of finance. Till now the exclusive revenues of the empire, consisting of the produce of the customs and excise duties on beer, spirits, tobacco, sugar, salt, and of stamp-duties, were not sufficient to cover the expenses. Therefore the several states were obliged to make up the difference by means of contributions according to the number of inhabitants (*Matrikularbeiträge*). By that, however, the finances of the various states fell into a dangerous fluctuation, and the states must, eventually, raise loans to pay the *Matrikularbeiträge*. Prince Bismarck aimed therefore to abolish these contributions and to enhance the revenues of the empire so far, that not only this might be done, but also surpluses should be gained, which, being distributed among the states, might enable them also to lessen their direct taxes. In the greatest state of the empire, Prussia, the people had already complained for many years of the pressure of direct taxes. This pressure was so much the more severe since the districts likewise, to supply their wants, depended almost entirely on direct taxes, raised in form of additional payments to the direct taxes of the state. Similar conditions of affairs prevailed in the other states. By this extra taxation especially the country and property were oppressed. The chancellor's plan tended, therefore, to leave to the districts in Prussia the whole or part of the produce of land- and house-taxes, and moreover to relieve them from a part of other burdens, namely, for education and support of the poor. Last but not least he aimed indeed to give a greater measure of protection to home industry and production.

The countries surrounding Germany, as Russia, Austria, France, had lately led the way to better protection of their manufactures. Thus Germany saw herself threatened from two sides, since the Free-trade party, on the one hand, insisted upon more liberal admission of foreign commodities, while, on the other hand, her neighbors endeavored to prohibit or restrict the import of German goods. The chancellor was, therefore, entirely right when he, during the debate on the new tariff, requested that in considering this pure question of interest all questions of politics and oppositional tactics be dropped. The Conservative party, formerly, like Bismarck himself, zealous partisans of the free-trade system, but now, through their master's conversion, totally changed, put themselves at the chancellor's disposal towards accomplishing both his financial and protectional schemes. Of course the conversion of the Conservative party, consisting for the most part of representatives of the landed wealth of the country, required and involved certain concessions; namely, that not only the products of manufactures but also of agriculture should be protected against foreign competition. The proposed customs-duties on corn and cattle were moderate enough. Wheat, rye, oats, and beans, for instance, should pay one mark (25 cents) per 100 kilogr., barley and Indian corn half a mark, etc. Far more considerable was the increase of the customs-duties on manufactures. In the first instance the abolished duties on iron and hardwares were not only restored, but, compared with the old, considerably enhanced. Pig-iron pays 25 cents per 100 kilogr.; bar-iron, 62½ cents; plate-iron, 75 cents; iron-wire, 75 cents; goods of cast-iron, 62½ cents; coarse hardwares, 75 cents to $4.75; fine hardwares, $6 to $15. A character still more distinctly protective is seen in the new duties on yarns and cloths. Cotton-yarn pays, according to the fineness, $3 to $17½ per 100 kilogr.; cotton goods, $20 to $62½; linen-yarn, 75 cents to $9; linen, $1½ to $30; woollen-yarn, 75 cents to $6; woollen goods, $25 to $112½, etc. The foreign competition in the smaller branches of industry being less keen and the financial product of the respective duties being quite trifling, the other duties of the new tariff are of less importance. The imports which produce high financial returns are coffee, petroleum, tobacco, corn, etc., but the entire imperial revenues from customs-duties does not exceed the sum of $50,000,000.

The new tariff passed the imperial diet, July 12, 1879, with 212 against 117 votes. The majority was composed of the Conservatives and the Centre, while the minority consisted of the several factions of Liberals. From this time dates the discord between the Liberals and Prince Bismarck, who now endeavored to rely upon the conservative-clerical coalition which had helped him to put the tariff into effect.

In spite of the insignificance of the duties on agricultural products, the latter encountered on the part of the Liberals a resistance far more violent than the duties on manufactures. They not only predicted the ruin of the German grain-trade, but also protested, above all, against the taxation of the poor man's bread. Hatred between the poor and the landlords, declared the eloquent Lasker, must be the inevitable consequence of duties on the necessaries of life; peace would depart, and the country would be most deeply agitated. Now it may be doubted whether the grain-duties can attain the purpose at which their advocates aimed, or at least pretended to aim—that is, to protect thereby agriculture against foreign competition and to raise its position. Germany has by degrees become a land wherein home agriculture is no longer able to provide for the supply of all its inhabitants. It cannot dispense with the import of foreign breadstuffs and raw materials. Home agriculture, too, suffers less by foreign competition than by the excessive mortgage indebtedness brought on through incessant partitions and changes of possession, which, occurring continually, makes landed property, not only in Germany, but in all Europe, so tributary to mobile capital that the cost of production is, indeed, far greater than in countries wherein such indebtedness as yet does not exist or has not taken the same dimensions. Consequently the true remedy for the European, and especially the German, agriculture is to be found only in the removal of that primary evil. Yet, still, the imposition of so trifling a duty on foreign corn could have by no means the dangerous consequences which the Liberal party showed in a dazzling light. In fact the price of grain in Germany has been scarcely affected by the duty, and the not inconsiderable revenue which the empire gains therefrom (about $5,000,000) works as a pure financial duty felt by nobody.

In close connection with the tendencies to encourage home production by means of an appropriate tariff of duties are similar efforts in the department of railway management. The constitution of the empire allows the government a control of great extent over the railways. Above all it is the prerogative of the empire to control the tariffs of freight. The constitution prescribes to the government explicitly to establish, as much as possible, a uniformity and reduction of tariffs. But while the greatest part of the railways was possessed by private companies, insuperable obstacles were opposed to the efforts of the government to enforce the constitution, and the chancellor became aware that a railway policy directed in the interests of home production was impracticable unless he succeeded in bringing all railways into the possession of the empire. A motion, however, proposed already in 1876 to the federal council, met at once the decided disapproval chiefly of the greater states, several of whom owned the railways laid in their territories and were by no means disposed to resign that possession in favor of the empire. The chancellor, who rather avoids a conflict with the federal governments as with the Parliament, abandoned therefore the idea of imperial railways for a while, and instead of it went the more energetically about a more practicable plan, namely, first of all, in Prussia, to bring the existing railways into this state's possession and here to realize his own ideas of railway policy. Yet still in the empire he tried to do what the constitution directed. He made motions in the federal council with the object of regulating the whole matter of freights according to uniform principles and procuring clearly defined fair tariffs. He proposed also such legal restraints that German railways should promote in the first instance German commerce, German production, and sale of German products, and not give preference to foreign commercial interests. These motions were, to quote the accompanying record, made under the impression "that till now, in management of the German railways, the struggle for financial returns has kept the task of promoting the interests of national economy too far in the background, and that the national interests of commerce fall a victim to a competition which will eventually compromise the solid and regular management of the railways themselves, but at all events hurt the public interests, for the promotion of which the railways have been built and privileged by the governments. I believe that it is correct to assert that the freights for the import of foreign products, on the average, are cheaper than those for the export of home-made or for the transport from one place of Germany to the other. The bounties on the import which in this way are granted to the foreigner, the high charge of the internal German commerce as compared with that of foreign countries to and across Germany, the disadvantages under which the German export to the west suffers by the high tariffs it has to bear in comparison with the cheaper passage from east to west, weigh heavily on our prosperity. . . It lies, according to my judgment, in the task of the governments to remedy these inconveniences as much as possible and to strive for such reform that German goods on German railways, at all events, should be treated at least as favorably and not be carried at dearer rates than foreign." The federal council assigned these motions to a commission, wherein they were speedily buried. No better fate had the chancellor's later steps in the same direction. Undaunted by this resistance on the part of the several governments, Bismarck returned to the prosecution of his railway reforms in Prussia. As the Prussian government, possessing already a greater part of the Prussian lines, could menace the private companies with a very dangerous competition by means of new lines, the plan of bringing them all into the state's possession would meet no great difficulties if the diet could be won for the scheme. Here, of course, the plan met not only the opposition of the Progressists, who occupy almost entirely the position of the Manchester school but are not numerous enough to exercise a weighty influence, but also the resistance of the mighty Catholic Centre, which struggles against every strengthening of the government's power both in Prussia and in the empire. Whilst the new tariff of duties was essentially accomplished by the help of the Centre, they denied to the chancellor's railway policy their assistance, but help was given by the Moderate Liberals. With this parliamentary reinforcement the transfer of the Prussian private lines into the state's possession was executed so rapidly that to-day only a trifling remainder of important private lines yet exists, and this will disappear within a few years. The stockholders were reimbursed with government annuities according to the average produce of the stocks during the last five years; the managers were indemnified, and the officers taken up by the state administration. Although the government in this way has taken upon itself a new debt to the amount of nearly $800,000,000, yet the financial success, notwithstanding the difficulties of the period of transition, is complete, and already annual surpluses of about $30,000,000 over the total interest are gained. Since the amortization of the railway debt is provided by law, the term, after which almost the whole network of railways will be in the unencumbered possession of the country, may be already calculated. The unparalleled advantages thereby secured for the commerce and the finances of the country need no further evidence.

If we inquire for the effects of the protective customs and railway policy inaugurated by Prince Bismarck the answer is, that the situation of industry and the general wealth also are decidedly improved. The productive power of labor is greatly enhanced, wages have risen, the import of many manufactures which are produced in Germany itself in sufficient quantity and high perfection is limited, but the export increased in an unexpected manner, and the revenues from customs-duties as well as the power of taxpaying considerably increased. The common phrases of the free-traders, that such occurrences are not a consequence of protection but would have taken place as well without protection, are refuted in this case by the fact that the main rivals of Germany, England and France, show by no means similar results. France, however, which in consequence of her defeat and her policy of revenge groans under a horrible tax-burden, may be omitted from the comparison. But the circumstance that England's export after the most favorable year, 1881, again decreases, whilst that of Germany continues to rise, may be considered as a conclusive evidence that the manufactures of Germany in many directions gain by degrees the precedence of the English, and that the assertions of free-traders that a protected country must necessarily decrease in power of export, are quite illusory; nay, the direct contrary of the truth. The evidences for these statements of German economical movements the reader will find in the statistics at the close of this article. Meanwhile we continue our account of the political occurrences in the German empire.

As an important part of the policy of completing the unity of the empire must be mentioned the incorporation of the free towns, Hamburg and Bremen, in the Customs' Union. These two small republics, as well as Lübeck, were allowed by the constitution to remain, with their territories, till further orders, out of the Customs' Union. The effect was, that the interests of these great commercial towns were not throughout congruent with those of Germany. They had a stake in promoting the import of foreign goods, without favoring the export from Germany in like measure. Especially did German agriculturalists complain of the exceptional position of Hamburg. While agriculture in Northern Germany owes its prosperity, for a great part, to a highly developed spirits-industry, long ago exceeding the supply of home markets and depending on a large export in the territory of Hamburg, numerous establishments had arisen which imported Russian spirits duty-free, refined it, and thus entered into a very serious competition with the native industry and its export. On the other hand the German textile manufacturers complained likewise, that the free towns did nothing to foster the export of German manufactures. At all events the continuance of these small free-trade territories was an anomaly, which, at the foundation of the Northern German Confederation, had been tolerated only under the supposition that the three towns would soon find it to their own interest to add to the political union an economical one also. To that supposition, indeed, Lübeck responded, but Hamburg and Bremen seemed not at all disposed to sacrifice their exceptional position. They were encouraged therein by the internal free-trade party. Bismarck, however, after the critical turn in the Customs' policy, determined to put an end to that condition also. First of all, he sought in accordance with the right of the federal council, to limit the free-trade territory to a smaller district. The free-trade party in Parliament declared this way unlawful, asserting that the custom limit could not be removed except by law, *i. e.*, with sanction of the imperial diet. Reckless of this opposition Bismarck, in the federal council, made the motion to incorporate the lower Elbe in the Customs' Union, without prejudice of Hamburg's position as a free port. On Hamburg, this movement fell like a stroke of lightning. They well perceived that the chancellor was in earnest, and the case critical. The Progressists in Parliament, indignant at a mode of proceeding so violent, moved a declaration that this procedure was not consistent either with the federal relation or with constitutional right. In the Parliament itself there were excited debates. The chancellor, however, meanwhile seeking to come to an agreement with Hamburg, struck a bargain with the Senate of the republic, by which the territory of free port should be limited to a small district, sufficient only for storehouses, etc., while the federal government pledged itself to bear a great part of the cost arising from the erection of the necessary buildings. While in the Parliament the verbal disputes still continued, the treaty, which was afterwards sanctioned by the legislature of Hamburg, became known, to the great surprise of the opposition. Thus the question of Hamburg's incorporation in the Customs' Union was settled. With Bremen the negotiations still continue, but they also appear likely to be brought to a final settlement before long.

The question of colonies, too, occupied the federal government and legislature. Of all the great European powers the German Empire alone, in consequence of her former divisions and weakness at sea, possessed no colonies. When the Northern German Confederation, and afterwards the German Empire, was established, public opinion as well as the legislature occasionally took up the question, whether it was advisable for Germany to acquire colonies. While some maintained that establishing colonies was for Germany a matter of national honor, and, in consequence of the continually increasing population, indeed a matter of economical necessity, others urged that the empire must restrict her maritime power to defence, and that the stream of emigration should not be artificially turned in a direction wherein no guarantees could be given for the welfare of emigrants. The federal government hesitated for some time. But when the navy had obtained a respectable strength and peace seemed established, the government aimed at acquisition of stations at sea, and showed a disposition to advance even to real colonial undertakings. Especially did the Pacific attract attention. German enterprise had there created some considerable settlements, and, in the neighborhood of China and Japan, the commerce with which increases every year, it appeared of moment to give to the German navy a strong base in the Pacific. When a Hamburg trading-house, possessing great plantations on the island of Samoa, by several misfortunes had become insolvent, the chancellor, holding this occasion favorable to give to the German sea-trade in the Pacific a strong basis for further enterprises, proposed to establish a joint-stock company with a capital of $2,500,000, which should acquire the respective possessions as well as the privileges therewith joined, while the empire would guarantee a moderate return on the investment. Since this arrangement was made in 1883 there has been great activity in German colonizing in the Pacific Ocean and on the coast of Africa. The German flag has been raised over the northern part of New Guinea, or Papua, and in various islands near Australia. A German protectorate was proclaimed over the Samoa Islands. The Tonga, Gilbert, and Solomon Islands, and finally part of the Caroline group were included in the grand scheme of Germany's colonial empire. In all these instances the claim of Germany is founded on the fact that German merchants and commercial companies have already had large interests in the various islands which needed protection. In South Africa, just north of the Orange River, which is the boundary of the British colonies, the district of Angra Pequeña was proclaimed a German protectorate in 1883. This bold step led to a prolonged diplomatic controversy with Great Britain, in which the substantial victory rested with Germany. Further disputes arose about the annexation of the Cameroons and other places on the West Coast of Africa. But Germany now has assured possession of nearly 800 miles on that side and has gained a foothold on the East Coast near the Straits of Bab-el-Mandeb. The first steps have been taken towards making colonies in Zululand, this last movement being perhaps the most threatening to British pretensions in Africa.

Meanwhile, the federal government still continued its endeavors to release the imperial finances from the *Matrikularbeiträge*, and, if possible, to increase the special revenues of the empire so far, that the particular states as well as the districts could be assisted by the empire. To this end it proposed an increase of the duty on malt liquor, a taxation of stocks, a defence-tax ("*Wehrsteuer*"), which should be paid by those who were not drafted for military service. Of these propositions the only one approved was that of a moderate taxation of stocks. Then the chancellor contrived to take up his old plan of a tobacco monopoly. The duties and taxes on tobacco had produced heretofore only $9,000,000. In the spring of 1882 Prince Bismarck drew up a scheme by which the net proceeds were calculated to be nearly $42,000,000 annually. The main difficulty of the project was, that all establishments which were then engaged in the manufacture or sale of tobacco must be indemnified by the empire for the loss of their business. The amount necessary for that purpose was estimated at $60,000,000. The Progressists and the moderate Liberals, too, roused the country to defeat the plan, which was denounced as socialistic, while its financial advantages were pronounced doubtful. In fact the repugnance of the Liberal factions was directed less against the monopoly than against the opening of a source of revenue, which might flow more abundantly each year and diminish the dependence of the federal government on the parliamentary grants. The Democratic-Federalist faction feared the monopoly as a step towards centralization, and the Catholic Centre was moved by the same consideration. In the federal council, too, the plan met serious resistance. Bavaria and Saxony, after Prussia the greatest states of the Confederacy, as well as a number of smaller states, voted against it. Prince Bismarck suffered a complete defeat, the plan being rejected by 276 votes against 43.

In financial politics, therefore, the government proceeded in a similar manner as it had formerly done in regard to the railways. Having failed to stir the imperial diet to opening of new and large sources of revenue, Bismarck sought in Prussia to put in motion a financial reform, whereby the opening of new imperial revenues should be made inevitable. We have already told that it was intended by the chancellor to reduce the direct taxes existing in the particular states, respectively, and to throw the produce of some into the hands of the district governments. In Prussia personal taxes include a so-called class-tax, raised gradually to an income of $750, and a so-called income-tax, raised from the larger incomes. At first it was Bismarck's intention to exempt from these taxes all incomes below $1500, and to raise a direct tax only from the larger incomes. This plan, however, is disapproved by all parties, the Liberals as well as the Conservatives and the Centre. It was barely possible, in 1883, to remove at least the first and second grades of the class-tax, reaching to an income of $225 and with a frightful number of seizures. A new proposition of the government to abolish also the third and fourth grades (to $300), wherein likewise the seizures are also numerous, and instead of that to submit the capital-interest to a proper tax, is still undecided. The chancellor prepared still another motion to make education in the primary schools entirely free and put the burden of support of these schools on the state or on the districts, and a similar bill in regard to parish-taxes intended to relieve the parishes. All these projects depend mainly on the correspondent increase of indirect taxes, and since the customs as well as the most lucrative excises belong to the empire, the tax-reform intended by Bismarck in Prussia depends essentially on the success of his projects in the empire.

Another important feature in the internal politics of Germany is the attempt to improve by law the condition of the laboring class. After the outrages against the emperor in 1878, the Parliament passed an exceptional law against the socialistic plots, which were made responsible for those outrages. The newspapers of the socialists were suppressed, their unions dissolved, a number of agitators exiled. The law in question, renewed since the first issue at several times, has had without doubt the effect to frighten away from the surface the revolutionary socialistic tendencies, and thereby to quicken the confidence of the earning classes. So far the recent strengthening of industry and commerce is surely due to a certain point to that law. But it is quite another question how far the socialistic agitation in the laboring class is effectually reduced, and whether the same would not, on the repeal of that law, soon blaze forth again. Fearing this, indeed, the government struggles against the repeal of the exceptional condition, while the more radical elements of the Liberals are not willing to prolong it. Besides, from the beginning the federal government was not inclined to rest satisfied with that manner of action. Rather it recognized, even when the exceptional law was introduced, the necessity of meeting by positive laws certain evils from which society suffers, and remedying some grievances of which the laborers complained with good reason. Measures were therefore announced tending to secure by help of the state an effectual insurance of laborers against disasters, disease, and invalidity. The first bill in this direction brought before the Parliament was that regarding the insurance against accident. Heretofore the conductors of factories, mines, and other industrial enterprises have been obliged by law to indemnify injured laborers for accidents, so far as the accident was not due to the fault of the laborer. Even this clause, however, made the benefit of the law in many cases illusory. The masters who were bound to indemnify, or the companies which had undertaken the insurance for a fixed premium, often replied to the claims of injured laborers or their families that the accident was self-incurred, and then the poor laborer or his family had first to prove the validity of their claim. It is easy to see that the injured, being generally unable to enter upon a prolix and costly process, must either totally abstain from their claim, or content themselves with a trifling indemnity. Numerous cases of this inequitable character are stated. The bill proposed by the government would remedy this evil in such a manner that all laborers must be insured, and all damages without exception indemnified. Insurance should be effectuated by an imperial board, and the greatest part of cost raised from the masters; besides, however, there was proposed an imperial subsidy and a contribution of laborers. The Liberal parties were offended especially at the compulsory insurance and the imperial subsidy, which was stigmatized by them as a socialistic or communistic idea. Others blamed the centralizing tendency of the project. In short neither this nor a second bill, which joined the scheme of accident-insurance with a plan of sickness-insurance, could obtain a parliamentary majority. The sickness-insurance was afterwards, May 29, 1883, regulated by a distinct law, according to which all operatives in the empire must be insured either in municipal, or factory, or stock-companies. A third accident-insurance bill, wherein the imperial board and the subsidy are cancelled, met with better success than the two former, and is now the law of the land.

These so-called social reforms have been praised by the admirers of the government in rather extravagant terms. It was undoubtedly an action of high merit to undertake the solution of such difficult problems in spite of the repugnance of considerable parties. Great obstacles thwart the governmental intentions: first, the antipathy of the free-traders to every public regulation of this kind; then the apprehensions of federalists as regards excessive centralization; last, but not least, a mania on the part of legislators to have every measure adjusted to each man's particular views, which produces a manifest want of political and parliamentary discipline. Even the herculean Bismarck groans fatigued under the burden of so many hinderances, and especially under this insubordination, which threatens to wear out the parliamentary system by incessant and vehement frictions.

It would, however, be wrong to attribute these frictions and hinderances of a fruitful political development entirely to an exaggerated individualism, which seems to be a characteristic of the German race. Surely, the opposition in German legislatures is often of a petty character. They often make an unbecoming bustle about trifles, while important reforms sometimes are frustrated for party considerations by grumbling and vain objections. It must, however, not be overlooked that the caution and distrust on the part of Liberals is by no means quite groundless. The struggles which in recent years have broken out between Parliament and government, sometimes abruptly enough, and in the future perhaps to be conducted even more vehemently, are for a great part a natural and inevitable product of contradictory tendencies, which are wrestling with each other for the supremacy in the political body. The liberal ideas of modern times, struggling to undermine the old authorities in state and church, and to supplant the powers of mystical origin by clear definable political organizations, drawing their force only from the depths of the people, rise continually in mighty waves against the political structures surviving from the past, boasting of a divine right, or at least seeking in self-preservation to hold out against the approaching floods. The old monarchies of Europe have partly performed the task to free the nations from the dissolution of feudalism, and to give to each an actual unity. Now they are being cast off, as in France, or etherealized, as in Britain, to mere nominal monarchies. Germany, by help of the illustrious family of Hohenzollern, obtained a few years ago unity, and therefore monarchy, real conscious and active monarchy, has here firmer roots and, it is probable, a longer future than in many other European nations. Nevertheless we still hear from afar the roar of the waves, threatening to overthrow the thrones and altars. Liberalism, enthusiastic for the common liberty with a certain ingenuousness and good nature, yet desiring to see its own omnipotence acknowledged, seeks to tear away from the historical authorities, by arguments of reason and beautiful speeches, piece after piece of their power. But behind liberalism there emerge already the gigantic outlines of that social movement which, embracing the broad masses of people, will transfer to them the driving political forces, and make the interests of the masses the axis of the social frame. Nobody sees more clearly this state of things, and the dangers which may follow from the ever-shifting, tempest-tossed waves of that great movement for the stability of present order, than Prince Bismarck and the venerable sovereign, to whom often a more passive rôle is with truth ascribed. They consequently oppose at the outset the attempts to enlarge the parliamentary power at cost of royalty, believing that such attempts simply furnish an inclined plane to a republic and finally to anarchy. In former days the Liberal party had displayed the banner of national unity, which was caught and carried to victory by William I. and Bismarck. It was therefore natural that at the baptism of the young empire the Liberal party stood god-father, and during a series of years continued to be its best support. But no sooner did they bring forward their resolve to enlarge the parliamentary powers than they found in Emperor William and his chancellor most resolute adversaries. Not one step further would these leaders take, in deference to the liberal instincts of the people, than what they had been compelled to do for the sake of accomplishing the unification of the empire. It is therefore not to be wondered at that the strife between the representatives of royalty on the one hand and the parliamentary rights on the other does not cease.

Towards the far more dangerous socialistic endeavors, the two leaders of present German politics believed it necessary to adopt a similar line of conduct by keeping them back, and at the same time making advances. It is plain, however, that at least those reforms, which have so far been prepared, fail to touch the root of the evils of society. Insurance against accidents, disease, and old age can heal only the exterior wounds, but not the primary evil of modern society, consisting in an excessive inequality of distribution. Other measures, either brought about already or announced, bear rather a reactionary character, hostile to freedom and revealing a spirit of caste. Whether a monarchical state can ever assist in radical reforms may be left undecided. We have no inducement to lose ourselves in considerations of the future.

The discord, existing for the last eight or nine years between the imperial government and the Liberals, helped to further the combination, which we have already mentioned in connection with the tariff. As the latter was brought about by the union of the Conservatives with the Centre, both these parties hoped mutually, and with them perhaps the government, that the union would serve for other purposes also. Both parties are united by their common positive ecclesiastical standpoint, and although Protestant and Catholic confessionalism strongly diverge, yet they have more points of contact one with another than with non-confessionalism, which goes hand-in-hand generally with political liberalism. A full accord, however, has not yet been attained, either between the two parties, or between the Centre and the government, because the Ultramontane party calls for the restoration of the Catholic Church in its former position, a claim which the government cannot and will not grant. The conflict between Prussia and Rome (so-called "Kulturkampf"), arising after 1870, and beginning in the regulating of certain controverted matters by the sovereignty of the state, has certainly taken much milder forms since 1879. The government, fearing that the struggle against the Catholic Church, connected, as it was, with a vacancy of several bishoprics and many hundreds of parishes, might unfavorably affect the religious and moral sense among the Catholic people, has restored some of the expelled bishops and relieved the priests from certain prescripts which the pope had disapproved. But the laws given by the state are by no means abrogated; the government has only received from the legislature discretionary powers to employ them or not, and neither Rome nor the Centre is satisfied with that. Indeed, this condition of affairs cannot endure, but as yet the issue of the conflict lies in darkness.

While thus dangerous dissensions have not been wanting in domestic affairs, the German government made at the same time all efforts to preserve for Europe the blessings of external peace. Everywhere Germany seems to employ its influence to unite the great European families of princes in an alliance, which, instead of wasting the forces of nations in international wars, shall keep off by common means, and with all energies, the internal enemies threatening the old monarchies. The Franco-Russian coalition, which a few years ago seemed probable, has disappeared from sight. Instead of that there has been between Germany and Russia a significant approach, which may cause in future curious movements of international politics. At all events republican France is isolated. Even its kindred as to race, Italy and Spain, are alienated from it. A monarchical coalition of unparalleled strength commands Europe at the present absolutely.

II. The latest census, taken June 5, 1882, which was designed to state not so much the number as the distribution of the inhabitants by their employments, has given the striking result that, while a constant increase of the population had been anticipated without doubt, there had really been, since Dec. 1, 1880, a decrease. While the census of 1880 gave the number of 45,234,061, that of June 5, 1882, showed but 45,222,113. The effectual diminution or at least stagnation of numbers is ascertained by the fact, that the number of living births in 1880 had fallen behind the average by 48,000, and in 1881 by more than 250,000. Since, however, the number of marriages, showing from 1878 to 1879 a diminution, slowly increases (1880, 337,342; 1881, 338,909; 1882, 350,457), there may be expected a recovery of births. The number of emigrants has, after the rapid swell in 1881 (210,547), rather diminished, and is stated for 1882 at 193,687, for 1883 at 166,119. By far the greatest part of this emigration falls to the United States of North America.

The following table shows the distribution of the inhabitants by their employments in 1882:

Agriculture and stock-raising	18,840,818
Forestry, hunting, and fishing	384,637
Mining and metal-working	16,058,080
Commerce and trade.	4,531,080
Hired service	938,294
Professions	2,222,982
Without occupation	2,246,222
Total	45,222,113

The production of the principal grain-crops and their area in 1881 and 1882 were as follows:

1881.	Acres.	Bushels.
Wheat	4,743,517	76,188,143
Rye	14,783,712	217,936,160
Barley	4,083,185	95,503,360
Oats	9,361,587	259,425,441
1882.		
Wheat	4,498,825	93,826,410
Rye	14,640,198	251,588,041
Barley	4,030,055	103,637,205
Oats	9,248,176	310,590,970

The imports and exports of the same grains for the succeeding years were as follows:

1881–82.	Imported.	Exported.
Wheat (bushels)	16,982,877	3,928,885
Rye "	25,302,711	506,414
Barley "	14,710,814	6,634,664
Oats "	23,392,073	1,464,540

1882–83.	Imported.	Exported.
Wheat (bushels)	26,599,191	5,364,292
Rye "	21,314,330	756,045
Barley "	19,921,992	4,607,593
Oats "	11,701,113	3,204,600

The following table shows the chief production of 1881, 1882, and 1883:

	1881. Tons.	1882. Tons.	1883. Tons.
Coal	48,688,161	52,118,595	55,888,490
Lignite	12,818,000	13,259,616	14,334,966
Potassic salts	905,891	1,201,392	
Iron ore	7,600,801	8,263,254	6,160,450
Pig-iron	2,914,009	3,380,806	3,419,635
Cast-iron	560,422	625,478	
Wrought-iron and steel	1,421,792	1,586,154	
Other iron	897,425	1,074,807	

The technical efficiency of the high furnaces amounted per workingman and year, in 1877, to about 100 tons; 1881, to 131 tons, and in 1882 reached even 150 tons. Nevertheless, the number of workingmen increased from 15,000 in 1878 to over 20,000 in 1882, and these 20,000 worked almost precisely double as much as the 22,000 occupied in 1874.

As regards the other industries, especially textile manufacture, full statistical reports are wanting; but some local branches give accounts. The celebrated silk industry of Crefeld, for instance, in 1882 exhibited 35,692 power-looms against 32,126 in 1881, the sale advanced from an amount of $19,000,000 to $21,000,000, and the wages paid in the same time increased from $6,400,000 to $7,000,000. Before all the agricultural industries, as sugar, spirits, beer, are constantly increasing. Especially the production of beet-sugar has developed with a rapidity which is beginning to excite apprehensions of a speedy overproduction. Already it amounts to twice that of France.

According to the demand of hands, the wages likewise have risen slowly but steadily. In the Westphalian mining districts, for instance, wages rose from 1879 to 1882 by 13.5 per cent., while employment at the same time augmented by 31 per cent.

The merchant fleet of Germany was as follows at the dates indicated:

Jan. 1, 1883.	Number.	Tonnage.
Sailing vessels	3,855	915,446
Steamers	515	311,204
Total	4,370	1,226,650
Jan. 1, 1884.		
Sailing vessels	3,712	894,778
Steamers	603	374,699
Total	4,315	1,269,477

The foreign commerce of Germany exhibits the following figures: The import amounted in 1882 to 15,299,855 tons against 14,848,178 tons in 1881 and 14,107,907 in 1880, with a value of $782,000,000 in 1882, $741,000,000 in 1881, $705,000,000 in 1880. The export amounted in 1882 to 17,208,846 tons against 16,672,116 in 1881 and 16,401,063 in 1880, with a value of $800,000,000 in 1882, $745,000,000 in 1881, and $724,000,000 in 1880. The increase of export was mainly in manufactures, as products of textile and hardware industry, beer, spirits, sugar. In 1883 the total value of the imports amounted to $815,625,000, and the value of the exports to $817,500,000. (F. S.)

GERM THEORY OF DISEASE, the recently widely adopted view that epidemic diseases are due to vegetable parasites, which gain entrance to the body through the medium of air, water, food, or otherwise, increase enormously, and exhaust the strength of or otherwise injuriously affect their host, while yielding minute and very hardy germs, which may be indefinitely distributed. This theory we may accept as definitely proved in the case of certain diseases of the lower animals. As regards man it is still a subject of controversy. The presumption is strongly in favor of its correctness, both from what we know of the character and life-history of these minute vegetable organisms, and from the close analogy of human epidemic diseases with those of the lower animals. It cannot, however, be considered as proved in the case of any human disease, though the wide-spread investigations now under way can scarcely fail to lead to a definite settlement of this disputed question.

The history of the germ theory may be very briefly told. The idea that epidemic diseases may be due to germs which float in the atmosphere, enter the body, and disturb its conditions by the development of parasitic life, was advanced by Kircher and favored by Linnæus, and has had many adherents since; while the minute organisms now known as Bacteria were observed by Leeuwenhoeck as early as 1675, and were first classified by O. F. Müller, in 1773. Yet the current belief until recently was that epidemic diseases are due to decaying organic matter, which acts as a poison when taken into the body by setting up a similar process of degeneration in the living tissues. Such was supposed to be the action of yeast until 1836, when Cagniard de la Tour discovered that yeast was a living plant. Yet it was still held that fermentation was due to the dead and decaying portions of this plant. About the same time Schwann discovered that putrefaction was due to something in the air which heat could destroy, and that meat would not putrefy in calcined air.

For some thirty years after this period the germ theory remained practically dormant, and it gained new life only in the memorable researches of Pasteur, and of many other active investigators, all of which have taken place since 1860. The most noted early work of Pasteur was in relation to *pebrine*, a disease of silkworms which threatened to destroy the silk industry of France. He proved conclusively, by researches in 1865 and subsequently, that this disease was due to minute vibratile corpuscles, which filled the body and checked its vital operations, and that it could be overcome by protecting the worms from infection. Another series of experiments, conducted about the same time by Pasteur, in France, and Koch, in Germany, on the terribly destructive disease of the domestic animals known as anthrax, charbon, or splenic fever, led to similar conclusions. It was shown very decisively that in this disease the tissues become filled with a minute bacterial organism, since known as *Bacillus anthracis*, that the disease could be communicated by inoculation with this organism, or by eating food that contained it, and that it never appeared in animals that were rigidly isolated from infectious material. Koch did more than this. He studied the life-history of these organisms, proved that they developed from minute globular spores into rod-like bodies, and that they increased in number with extreme rapidity in an organic infusion, while the dried spores had great resisting powers. Dried blood containing these spores, when kept for four years, communicated the splenic fever to inoculated cattle as readily as fresh material. But the investigations in relation to anthrax went further than this, and yielded exceedingly valuable results. Cultivation of *Bacillus anthracis* in infusions, through several generations, proved to weaken the vitality of the organism through the action of oxygen or other cause. The subsequent inoculation of cattle with this weakened material produced in them a mild form of the disease, which acted to protect them against the fatal effects of subsequent inoculation with the strongest virus. This discovery has proved of the highest industrial importance, thousands of cattle being annually secured against splenic fever by inoculation with these culture germs.

It is not necessary to mention here the various other diseases of the lower animals which seem to be due to bacteria, and may be guarded against by inoculation, or to describe the action of bacteria in inducing the several kinds of fermentation in vegetable products. It will suffice to say that all fermentation and putrefaction seem to be due to chemical changes induced by the nutrient action of minute organisms, with the exception of what is known as "false fermentation," set up by the action of disintegrating organic molecules. The indications are that these organisms play a somewhat similar rôle in living tissues, from which they extract nutriment, inducing pathological changes, and increasing at the expense of the health or life of their host. We need here refer to but one other series of experiments on the lower animals, those recently made by Pasteur into the cause of *rabies*, the "mad dog" disease. It will suffice to say that these experiments were of the same character as those in splenic fever, and yielded similar results. It has been shown that a bacterial organism is present in rabies, that by inoculation with it the disease may be communicated to other animals of various species, and that its energy may be reduced by cultivation and a mild form of rabies produced, which is protective against the most virulent virus.

Investigations of a similar nature have been made into the character of the several epidemic diseases to which man is subject. As a result it may be said that bacterial organisms have been found in nearly every case, though it has not yet been clearly demonstrated that these organisms are the cause of the disease, or that it can be hindered by inoculation with culture germs. The only human disease in which inoculation has proved clearly useful is small-pox, and unluckily for the theory this disease has not yet been traced to the action of any specific bacterium. That such an organism will yet be discovered seems probable from what we know of the conditions of inoculation in the diseases of the lower animals described. Of the human diseases in which the presence of bacteria has been traced *Septicœmia* was the first investigated. There is strong reason to believe that the inflammation of open wounds, and the blood-poisoning thence resulting, are due to the propagation of minute organisms introduced from the air. As a result of this theory the highly valuable preventive process known as *Listerism* was adopted, the wound being permeated with carbolic acid or mercuric chloride spray and lotions to kill the germs present, the instruments used being carefully disinfected, and the wound then dressed with antiseptic dressings and bandages. Some writers, however, question the theory, and claim that the benefit is due to the extra cleanliness and care exercised. Of the other diseases in which bacteria have been discovered, by some of the considerable army of recent investigators, may be named *scarlatina*, *measles*, *diphtheria*, *typhoid*, *yellow*, *relapsing*, and *malarial fevers*, *leprosy*, and, more recently, *tuberculosis* and *cholera*. The studies in the last-named diseases have been made by the indefatigable Koch, who detected in the tubercle of consumption a characteristic and previously unknown bacterium, somewhat resembling that of leprosy. By inoculation with this he succeeded in producing the disease in rabbits and guinea-pigs, a result not yet attained in the case of any other human disease. He studied cholera patients in Egypt and India, and found their organs to swarm with bacteria of many kinds, of which there was one peculiar, comma-shaped form always present, but never found in those not suffering from cholera. This *comma bacillus* is at present the centre of an active controversy, Klein and Lankester, of England, and others, strongly claiming that it has nothing to do with producing cholera, and is perfectly harmless. Inoculation with culture germs of the comma bacillus have been made during the recent outbreak of cholera in France and Spain, but its efficacy is very doubtful, and as yet, beyond the case of small-pox and possibly of hydrophobia, no human disease has been successfully treated by the inoculation method so far as evidence shows.

The argument of the opponents of the germ theory is, that the microbes or bacteria found are the result, not the cause, of disease. Dr. Bastian contends that they are "pathological products," generated in the body after it has become diseased through other contagious matter. A similar view is entertained by many other physicians. The evidence in its favor, however, is entirely negative, and is mainly based on the existence of bacteria in healthy organisms. This view is met by the assertion that there are many species of bacteria, each with its own form, habits, and properties; that many of these are innocuous in human bodies, not finding there their natural habitat, and that each distinct disease has its distinct form of bacterium, which always accompanies it. Koch made extensive experiments in this direction, and found that he could produce separate diseases by using bacterial matter from different sources, and containing bacteria of different appearance. These facts, and those relating to fermentation and putrefaction, and to the discovery of the active agency of bacteria in many diseases of the lower animals, amount to nearly a demonstration of the germ theory as applied to human epidemic diseases. Yet before the demonstration can be complete many new investigations and experiments need to be made, and the objections disproved by established results like those reached in the case of splenic fever, rabies, etc., in the lower animals. The experiments with the bacteria of tuberculosis are the most significant that have yet been made in this direction. (See BACTERIA, Vol. II.) (C. M.)

GÉRÔME, JÉAN LÉON, a French painter, was born at Vesoul, May 11, 1824, being the son of a goldsmith. He went to Paris in 1841, and studied under Delaroche, while pursuing the course of the École des Beaux Arts. In 1844 he went with Delaroche to Italy, and in 1847 exhibited his first picture, A Cock-fight, gaining thereby a third-class medal. In 1863 he was made professor of painting in the École des Beaux Arts. Gérôme travelled in the East in 1853 and has since often resorted thither for subjects for his canvas. In 1855 he exhibited The Age of Augustus, which was purchased by the French government. His chief works, indeed, have been taken from ancient classic life. Among these are The Gladiators Saluting Cæsar (1859); The Wife of Candaules (1859); Phryne before the Judges (1860); The Death of Cæsar (1867). Among the works derived from his Eastern studies are The Call to Prayer at Cairo (1865); The Clothes Merchant (1868); The Door of the Mosque (1876). Many of his works have become widely known by photographs and engravings. His subjects are often sombre and sometimes indecent, but the drawing is powerful, and gives them a peculiar fascination. The painter's boldness and evident confidence in preparing his work go far to disarm criticism. They are thoroughly thought out and carefully finished, and the choice of subject seems an evidence of the moral corruption and decay of the empire rather than a personal fault.

GERRY, ELBRIDGE (1744–1814), an American statesman, was born at Marblehead, Mass., July 17, 1744. He graduated at Harvard College in 1762, and was a successful merchant in his native town, which in 1772 he was chosen to represent in the State legislature. At his suggestion a law encouraging the fitting out of armed vessels, and establishing a court of admiralty, was passed in November, 1775. Elected to the Continental Congress he took his seat Feb. 9, 1776, and was one of the signers of the Declaration of Independence. He was generally chairman of the committee on finances, and in 1780 was made president of the Treasury Board. The refusal of Congress to adopt efficient measures for raising revenue caused Gerry to withdraw soon after, and he did not return until 1783. Gerry was a delegate to the Constitutional Convention in 1787, but refused to sign the Constitution then framed. He was again a member of Congress from 1789 to 1793. In 1797 Pinckney, Marshall, and Gerry were sent on a special mission to France to obtain compensation for French spoliations. They found Talleyrand the minister of foreign affairs, and had great difficulty in obtaining a hearing. Finally Talleyrand managed to produce division among them; Pinckney and Marshall withdrew, while Gerry remained to afford further diversion to the wily diplomatist. At last finding that there was no prospect of accomplishing anything Gerry returned home in October, 1798. His reputation had suffered, and when the Republicans made him a candidate for governor of Massachusetts he was defeated. After some other attempts he was finally chosen in 1810, and was re-elected in the next year. In order to perpetuate their hard-won control of the State, the Democrats, as his party was now called, made a new arrangement of senatorial districts, and in some instances formed them by townships instead of counties as had heretofore been done. In Essex county the result appeared on the map like a grotesque animal which was speedily known as the "gerrymander," and the word has since prevailed in political vocabulary. Gerry was defeated for governor in 1812, but in the same year he was chosen Vice-President of the United States on the ticket with Madison. He did not live out his term, but died at Washington, D. C., Nov. 23, 1814.

GERSTER, ETELKA, a Hungarian singer, was born at Kaschau, June 16, 1857. The director of the Vienna Conservatory, having chanced to hear her sing in a religious procession, advised that she be placed under the instruction of Madame Marchesi, with whom she studied three years. In January, 1876, she made her *début* in Venice in Verdi's *Rigoletto* with wonderful success. She afterwards took up the parts of Ophelia, Lucia, Amina, and Marguerite. She then went to Berlin, where she had unexampled success. After a brief stay in Buda-Pesth she went to St. Petersburg and Moscow, where she received special marks of favor from the emperor and empress. Returning through Germany she appeared at London in 1877, and remained through the season of 1878, after which she came to the United States. She returned to Europe in 1879, but again visited America in 1880. She was married to M. Carlo Gardini in 1877. Her voice is a pure high soprano.

GETTY, GEORGE WASHINGTON, an American general, was born at Georgetown, D. C., Oct. 2, 1819. He graduated at West Point in 1840, became second lieutenant of artillery, and served on the Canada border. In the Mexican war he was engaged in the battles around the city of Mexico. He afterwards served in Florida against the Seminoles, and from 1857 to 1861 was employed on frontier duty. During the civil war he was connected with the Army of the Potomac. He was a lieutenant-colonel and aide-de-camp to Gen. McClellan in his campaign against Richmond, and was made brigadier-general of volunteers, Sept. 25, 1862. He fought at South Mountain, Antietam, and Fredericksburg. He was severely wounded in the battle of the Wilderness, May 5, 1864; took part in the defence of Washington and in operations in the Shenandoah Valley, and served with distinction from the siege of Petersburg until the surrender of Gen. Lee, attaining the brevet rank of major-general. He commanded various military districts until he was mustered out of the volunteer service in September, 1866. He then returned to the command of his regiment, the Third artillery.

GETTYSBURG, a borough of Pennsylvania, county-seat of Adams county, stands in a picturesque hilly region, 50 miles S. S. W. of Harrisburg, by the Harrisburg and Gettysburg Railroad (35 miles in a direct line). The Hanover and Gettysburg Railroad extends eastward to the Northern Central Railway. To the west are the South Mountain range and the Blue Ridge, the latter 8 miles distant. Gettysburg has a court-house, alms-house, and other county buildings, 2 national banks, 10 churches, 7 hotels, and 2 weekly newspapers. It has manufactures of castings, machinery, flour, boxes, harness, leather, and other goods. The town is neatly yet quaintly built, is gas-lighted, and has water-works. It is the seat of Pennsylvania College (Lutheran, founded 1832) and of a Lutheran Theological Seminary. The population is largely of German origin. Near the town are Round Top Park and Battlefield Park, with numerous monuments commemorating incidents of the great battle fought here, July 1–3, 1863. There is also a large national cemetery in which the dead of that battle are buried, and in which is a fine national monument in honor of the fallen soldiers. Near the town is the well-known Katalysine Spring. Gettysburg was founded in 1800, and was named in honor of James Gettys, its first settler. It was incorporated in 1806.

GETTYSBURG, CAMPAIGN AND BATTLE OF. I. In June, 1863, Gen. Joseph Hooker commanded the Army of the Potomac, then at Falmouth, Va., on the north bank of the Rappahannock, while the Confederate Army of Northern Virginia was under Gen. Robert E. Lee, on the south bank at Fredericksburg. The positions of the two armies were such that neither could be attacked to advantage except by a wide detour. The Confederate commander made the first move with a view to pass as rapidly as possible northward into Maryland and Pennsylvania. Some of the reasons for thus taking the initiative are evident. Lee would relieve the Shenandoah Valley from the devastation of the Union troops, transferring the scene of hostility beyond the Potomac; gain a favorable opportunity to strike Hooker's army in movement; derange the national plan of campaign for the whole summer, thus affording the Confederates time for recuperation and resupply; meet and encourage the prompt rising of secession friends in Maryland, and the co-operation of secret friends farther north.

Lee's army was composed of three army corps. The First corps, under Lieut.-Gen. James Longstreet, had three divisions: (1) Maj.-Gen. McLaws, with 4 brigades and 4 batteries of artillery—19 regiments, aggregate 12,000 men; (2) Maj.-Gen. Pickett, with 4 brigades and 4 batteries—19 regiments, 7000; (3) Maj.-Gen. Hood, with 4 brigades and 4 batteries—18 regiments, 12,000; and an artillery reserve of ten batteries. The Second corps, under Lieut.-Gen. R. S. Ewell, had three divisions: (1) Maj.-Gen. Early, with 4 brigades and 4 batteries—21 regiments, 9000; (2) Maj.-Gen. Ed. Johnson, with 4 brigades and 4 batteries—22 regiments, 12,000; (3) Maj.-Gen. Rodes, with 5 brigades and 4 batteries—22 regiments, 10,000; and an artillery reserve of 2 battalions—8 batteries. The Third corps, under Lieut.-Gen. A. P. Hill, had also three divisions: (1) Maj.-Gen. Anderson, with 5 brigades and 3 batteries—21 regiments, 15,000; (2) Maj.-Gen. Heth, with 4 brigades and 4 batteries—17 regiments, 10,000; (3) Maj.-Gen. Pender, with 4 brigades and 4 batteries—19 regiments, 10,000; and an artillery reserve of 2 battalions—9 batteries. The cavalry division under Maj.-Gen. J. E. B. Stuart had 6 brigades, a total of 29 regiments, and 6 batteries of horse-artillery. The cavalry, including some reserve artillery detachments under Imboden and Mosby, were estimated by good authority to be 11,000 strong. This aggregates for Lee's army a force of 108,000.

Hooker's army consisted of 8 small army corps as follows: The First corps, under Maj.-Gen. J. F. Reynolds, with 3 divisions: (1) Brig.-Gen. Wadsworth, 2 brigades—11 regiments; (2) Brig.-Gen. Robinson, 2 brigades—11 regiments; (3) Maj.-Gen. Doubleday, 3 brigades—12 regiments; and an artillery reserve, 1 brigade of 5 batteries. The Second corps, under Maj.-Gen. W. S. Hancock, with 3 divisions: (1) Brig.-Gen. Caldwell, 4 brigades—18 regiments; (2) Brig.-Gen. Gibbon, 3 brigades—13 regiments, and a regiment unattached (Andrew's sharpshooters); (3) Brig.-Gen. Alex. Hays, 3 brigades—13 regiments; an artillery brigade of 4 batteries, and a cavalry squadron—2 companies. The Third corps, under Maj.-Gen. Sickles, with 2 divisions: (1) Maj.-Gen. Birney, 3 brigades—18 regiments; (2) Brig.-Gen. Humphreys, 3 brigades—19 regiments; and an artillery brigade of 5 batteries. The Fifth corps, under Maj.-Gen. Sykes, with 3 divisions: (1) Brig.-Gen. Barnes, 3 brigades—12 regiments; (2) Brig.-Gen. Ayres, 3 brigades—13 regiments; (3) Brig.-Gen. Crawford, 2 brigades—9 regiments; and an artillery brigade of 5 batteries. The Sixth corps, under Maj.-Gen. Sedgwick, with 3 divisions: (1) Brig.-Gen. Wright, 3 brigades—12 regiments; (2) Brig.-Gen. Howe, 2 brigades—10 regiments; (3) Brig.-Gen. Wheaton, 3 brigades—14 regiments; an artillery brigade of 8 batteries, and a cavalry detachment—2 companies. The Eleventh corps, under Maj.-Gen. Howard, with 3 divisions: (1) Brig.-Gen. Barlow, 2 brigades—8 regiments; (2) Brig.-Gen. Von Steinwehr, 2 brigades—8 regiments; (3) Maj.-Gen. Schurz, 2 brigades—10 regiments; an artillery brigade of 5 batteries, and a cavalry detachment—3 companies. The Twelfth corps, under Maj.-Gen. Slocum, with 2 divisions: (1) Brig.-Gen. Williams, 3 brigades—14 regiments; (2) Brig.-Gen. Geary, 3 brigades—14 regiments; an artillery brigade of 4 batteries, and a headquarter guard of 2 companies. The cavalry corps, under Maj.-Gen. Alfred Pleasanton, had 3 divisions: (1) Brig.-Gen. Buford, 3 brigades—10 regiments; (2) Brig.-Gen. Gregg, 3 brigades—12 regiments and 1 detached company; (3) Brig.-Gen. Kilpatrick, 2 brigades—8 regiments; horse-artillery, 2 brigades—9 batteries. The reserve artillery, under Brig. Gen. Tyler, had 5 brigades—25 batteries. For train-guards, etc., there were 2 regiments and 2 companies. The provost-marshal guard, under Brig.-Gen. Patrick, had 3 regiments—40 companies. The engineer brigade, under Brig.-Gen. Benham, had 2 regiments and 1 company of regulars.

The Confederate army moved by the way of Culpepper Court-House and the Shenandoah Valley, having *en route* several cavalry encounters, and one considerable battle, defeating about 7000 Nationals, under Brig.-Gen. Milroy, at Winchester. It finished the crossing of the Potomac the 24th of June, at Sharpsburg, Md., and on the 28th Longstreet and Hill were concentrated at Chambersburg, Pa., Ewell, with two divisions, at Carlisle, and one, Early's, farther east at York.

The National army, the instant its commander divined Lee's intention, followed up his movement on interior lines, passing through Warrenton Junction, Thoroughfare Gap, Centreville, Ashby's Gap, and Leesburg, completing its crossing of the Potomac at Edward's Ferry, June 26; and on the 28th its commander with head-quarters was at Frederick, Md., with a line of corps with wide intervals extending westward from that place, through Middletown, to Maryland Heights, opposite Harper's Ferry. When Hooker first had discovered that one of Lee's corps was across the Potomac he proposed to himself to send to Harper's Ferry "a corps or two to sever Ewell from the balance of the rebel army, in case Ewell should make a protracted sojourn with his Pennsylvania neighbors;" Hooker depended upon increasing the force which he intended here to send against Lee, using the garrison of Maryland Heights, which was 11,000 strong; but the instant it was known that Lee's whole force was crossing the river, Hooker changed his plan, designing now, as he declared, "to seize the passes of South Mountain . . . and confine him, Lee, to one line of invasion." While executing this plan, Hooker, on June 27, asked for complete control of the 11,000 men, the garrison of Maryland Heights, under Brig.-Gen. French, intending to move them from their anchorage in support of his columns. His request was refused, and the next day he was relieved from command by Maj.-Gen. Geo. G. Meade.

The excitement caused among the inhabitants by

Lee's invasion and wide distribution of forces was intense. The citizens in great numbers fled across the Susquehanna, and the telegraph was surcharged with wild reports from every quarter, which were at once sent to Gen. Meade. Believing from information so gained that Lee's main body was threatening either Harrisburg or Baltimore, Meade at once adopted a new plan: to bring his troops to the Frederick and Harrisburg line of advance, and then move northward and extend his corps so far to the east as to relieve Baltimore.

On June 30 Meade's army was occupying a broken line over 30 miles in extent, the Sixth corps on the right near Manchester, the Fifth near Union Mills, the Twelfth near Littletown on the Hanover road, the Second near Uniontown, Meade's head-quarters at Taneytown, the Third between Taneytown and Emmittsburg, the Eleventh at Emmittsburg, the First 6 miles from Emmittsburg northward. Buford's cavalry held the extreme left at Gettysburg, while the remainder of the cavalry corps went to front and right in vicinity of Hanover. Such was substantially the position of Meade's army on the eve of the great battle. The organization had varied much since Hooker's start from Falmouth; many regiments, by expiration of service, having gone, and others having been brought in from the defences of Washington, from Baltimore, and elsewhere. Meade's morning report, June 30, gives his strength in aggregate: infantry, 77,208; artillery, 6692; cavalry, 12,420; in all, 96,320, with 352 cannon. French's division, 11,000 strong, which had been denied to Hooker, was immediately allowed to Meade, and was in reserve at Frederick, Md. This added, gives a grand aggregate of 107,320. The two armies were very nearly of the same size.

Lee found difficulty in getting information. By a mistake of instructions his cavalry under Stuart, instead of keeping between the two armies, had crossed the Potomac at Seneca below Meade and was making a raid past the rear and right flank of the Army of the Potomac, *i. e.*, between that army and the cities of Washington and Baltimore. Stuart thus cut Meade's communications, and at first did considerable damage, but was obliged to hasten his return. Kilpatrick, supported by infantry, was close upon him, and in fact forced Stuart to a combat near Hanover Junction, Pa., June 30, after which, with all possible speed, Stuart proceeded to join Lee. Meanwhile, during the night of the 28th, Lee learned that the National army had crossed the Potomac and was already at Frederick, Md. Seeing his communications thus endangered, he immediately commenced concentration, ordering Hill's corps to move to Cashtown, 8 miles west of Gettysburg, on June 29, and Longstreet to follow the next day, leaving Pickett's division with his reserve trains at Chambersburg. Ewell was instructed to bring together his divisions at or near Cashtown as soon as he could make the march. On the 29th Heth's division of Hill's corps reached Cashtown, and the next day he sent Pettigrew's brigade to Gettysburg to procure shoes and other supplies. Pettigrew had just arrived at 11 A. M. when he descried the approach of Buford's cavalry. Pettigrew hitherto finding only detachments of militia was surprised thus to meet a portion of Meade's army and so, in haste, withdrew to his division at Cashtown. Buford, who was just in time to seize the town of Gettysburg, immediately pushed out his force so as to cover the approaches from the west, sending his pickets and scouts as far out as possible. Aware that he was in the presence of infantry, he prepared his command to fight on foot. He placed his horse artillery in position so as to sweep the roads and supported it by his two brigades, Gen. Devens holding the right and Gen. Gamble the left. Devens covered the ground from the Mummasburg road to the Chambersburg Railroad, Gamble thence southward as far as the Millerstown road, the whole front from the York around to and beyond the Millerstown road being studded by a good picket-line.

On the evening of the 30th Lee's command was encamped as follows: Hill's corps—two divisions—Heth and Pender, at Cashtown; Anderson *en route* near Fayetteville; Longstreet's corps—Hood and McLaw's divisions—at Greenwood; Pickett's division at Chambersburg; Ewell's corps, Rodes, at Heidlersburg; Early, 3 miles off on the road to Berlin; and Ed. Johnson, with Brown's reserve artillery, between Greenvillage and Scotland. Four divisions, 39,000 men, were within 10 miles of Gettysburg and it was an easy day's march for Lee's entire force, excepting Pickett's division, to concentrate at or near Cashtown before noon of the next day, so that Lee's army was now substantially massed upon the left flank of Gen. Meade's scattered forces.

II. Battle. *First Day.*—The orders of Gen. Meade for July 1 were: "Head-quarters at Taneytown; Third corps to Emmittsburg; Second corps to Taneytown; Fifth corps to Hanover; Twelfth corps to Two Taverns; First corps to Gettysburg; Eleventh corps to Gettysburg (in supporting distance); Sixth corps to Manchester. Cavalry to front and flanks, well out in all directions, giving timely notice of positions and movements of the enemy."

Gettysburg, in 1863, was a town of about 2500 inhabitants. It rests in a sort of highland basin among the somewhat broken parallel ridges which trend north and south, and which westward become steppes toward the South Mountain chain. The environs are occupied by a seminary, a college, almshouse, and commodious farm-houses. The numerous approaches by wagon-roads and a railway, which meet at the town like spokes at the wheel-centre, pass through handsome groves, orchards, and well-watered fertile fields. The first ridge to the west stretches out past the suburbs. Upon it are the Lutheran Seminary and a few residences. It was upon its crest, which is intersected by the Chambersburg Railroad and pike, the Hagerstown and the Mummasburg wagon-roads, that Gen. Buford had established his small division of cavalry. Here the dawn of July 1 found his men in position diligently guarding every entrance to Gettysburg. Toward it the Confederate Gen. A. P. Hill advanced; Heth, with Pegram's battalion of artillery, led; Pender, with McIntosh's battalion, followed, advancing on the Chambersburg pike. Some 2 miles from Gettysburg Heth encountered Buford's advance, and at 9 A. M. quickly formed a line of battle, using Archer's and Davis' brigades in front, with artillery, and Pettigrew's and Brokenborough's in reserve. Buford's skirmishers who had opened fire were soon driven back slowly to the Seminary Ridge. As Buford thus beheld the rapid approach of Hill's command he began to look earnestly for help. The sun was clearing the valleys from the morning mists, and, looking southward, to his joy he discovered Reynolds' head of column. Soon the general himself met him near the Seminary and took command. Wadsworth's division had reached Buford's position, and Doubleday's and Robinson's divisions were some distance behind. By 10 o'clock Wadsworth's men, filing through the woods and fields, were deployed upon a ridge some 800 yards west of the seminary; 15 minutes later Reynolds himself pushed one brigade, Cutler's, into position, so as to hold an important point near the Chambersburg road. This brigade extended north beyond the road, in echelon to the rear, for some distance, the space on the road being occupied by Hall's battery. Meredith soon held the woods to the left of Cutler, and his line ran southward across Willoughby's Run. Meredith was just in time to meet Confederate Archer's first charge, which he promptly repulsed, capturing General Archer himself and 1000 prisoners. Just at this juncture General Reynolds, near his front line, while posting troops at a place now well marked, was killed by a rifle-shot. Here, as the Confederates met stout resistance, A. P. Hill formed new lines. Davis' brigade was put to the left or north of the pike, while Archer's, Pettigrew's, and Brokenborough's were extended to the south. Pender's division, now on the ground, made a second line, several hundred yards to rear, Thomas' brigade to the left, and the brigades of Lane, Scales, and Perrin to the right of the pike. The two accompanying battalions of artillery were distributed to the most favorable positions on high ground. Then again the Confederates advanced, overlapped Meredith's brigade and forced it to retire.

Doubleday, who had preceded his division to the field, now replacing Reynolds, quickly brought up the Sixth Wisconsin, which had been in reserve, and moved it to the right of the pike and into conjunction with two regiments of Cutler's brigade, which had swung back to the railway cut in the same neighborhood. Here Davis' Confederate brigade, pressing too rapidly after our retiring men and driving back Hall's battery, was caught by a front and flank fire, and two of his regiments were forced to surrender. This quick movement released a part of Hall's battery and one of Cutler's regiments, which had been cut off and threatened with capture. Meanwhile the two remaining divisions of the First corps had reached the Seminary. The one now under Gen. Rowley was sent with his batteries in support of Meredith, still holding advance ground south of the pike, and for a time Robinson was kept in column for a reserve nearer town. This was at 11 A. M. Much irregular fighting occurred to both sides on account of the breaking up of the lines. Now we find Biddle's brigade looking north with a line of guns completely at right angles to the main position, and the same is true of two or three Confederate brigades; but by much labor Wadsworth had reorganized his line along the Seminary Ridge, and Doubleday's left was again strongly pressed by the enemy, when a report came that his right was being turned. To meet this Robinson sent Baxter's brigade to the extreme right and went thither in person. He soon brought up Paul's brigade, and with it made as strong a right flank as he could. In this position Robinson's division did grand work, repulsing repeated front attacks and securing almost an entire brigade (Iverson's) as prisoners of war.

The Eleventh corps had left Emmittsburg at 8 A. M. by two roads: Barlow's division on the direct and the other two divisions by Horner's Mill. Gen. Howard, its commander, after setting his corps in motion, had ridden rapidly forward, and was upon Fahnestock's Observatory, in Gettysburg, examining the situation, when Reynolds' death was reported to him. Assuming command of the field he sent word at once to the commanders of his moving columns, also to Gen. Slocum, then several miles back on the Baltimore pike, and to Gen. Sickles at Emmittsburg, that a battle was in progress and urged them to hasten thither; despatches were at the same time sent to Gen. Meade. Gen. Howard went from Gettysburg to a height just south-west of the town, now known as Cemetery Hill, where he had selected a position for his general reserve and one to be held at all hazards in case the Oak Ridge should be forced. Here Gen. Schurz, now commanding the Eleventh corps, hastening up, met him at 11.30 A. M. Schurz was instructed to place Steinwehr's division (the Second) there in support of the reserve batteries of the corps, and to send forward his other two divisions, with the batteries accompanying them, to seize the high ground on the right of the First corps. Between 12 and 1 o'clock these two divisions were hurried through the town, their batteries preceding them at a trot, and formed in lines facing towards the north-west. Two batteries occupied the interval between the First and Eleventh corps. By 2.30 P. M., Gen. Howard having gone along his front, and having established his head-quarters, Steinwehr's division and the reserve batteries defensively on Cemetery Hill, ordered Schurz to advance his front lines and seize a wooded height to the north of Robinson's position. But word was brought from Buford, then on the right near the Harrisburg road, that Ewell's entire corps was coming in from the north, between the Harrisburg and Carlisle roads. Howard notified Doubleday and halted Schurz, whose skirmishers found the high ground in question already occupied by the enemy in force.

To return to Lee's army. The two divisions near Heidlersburg, namely, Rodes' and Early's, set out at daylight directly for Cashtown; but getting part way Rodes was directed by his corps commander, Ewell, to turn southward towards Hill's left flank at Gettysburg. Early set out via Hunterstown; from this point he also took the Gettysburg direction. The two divisions approached each other; Rodes, reaching a place north of Gettysburg, deployed with his right on the Mummasburg and his left touching the Carlisle road about 1 P. M. His left was close by Rock Creek. His order in line was as follows: Iverson's brigade on the right, then O'Neal's and Dole's, Daniels' and Ramseur's brigades, in column of regiments, as reserves. This division then moved forward, and when near enough to the First and Eleventh corps O'Neal and Iverson were ordered to attack, and Daniels brought up to support their flank. O'Neal, encountering a severe fire, seems to have deviated to the left, leaving Iverson's command of three regiments to be overwhelmed by the Nationals under Robinson and himself to be forced back. At 3.30 P. M. Daniels found himself some 1000 yards north of the Chambersburg pike and parallel to it; while Ramseur, with two brigades and a remnant of Iverson's, had swung around, facing Robinson in a line nearly perpendicular to Daniels. Meanwhile, as the contest was going on with Robinson, Dole's and part of O'Neal's brigade faced Schurz's two divisions; when he moved forward the engagement became very severe, especially on the Union right, Barlow's front. About 3 P. M. Dole's men were giving way and Barlow was evidently gaining ground. At this juncture Confederate Early's whole division made its appearance, coming up on the Harrisburg road. Early planted artillery and set it at work, and sent forward Gordon's brigade to the left of Dole's and in his support. This flank movement forced back Ames, who had replaced Barlow, severely wounded, to his second line. A little later Confederate Hays' and Hoke's brigades, in deployed lines, followed Gordon's, and striking the Eleventh corps in flank accomplished its complete displacement.

At 3.30 P. M. the Confederate lines, now extending along Howard's entire front and beyond his flanks, were somewhat readjusted and then pressed forward. The first break in Howard's front was near the centre. Help had been called for by both Doubleday and Schurz; but as it was necessary to hold the Cemetery, but few reinforcements were forwarded. However, Costar's brigade, of Steinwehr's division, was sent to the front of the town, and ordered to barricade so as to cover the anticipated retreat. Finally, when resistance became hopeless, Howard sent positive orders to both Schurz and Doubleday to fall back to the Cemetery as slowly as possible and take post; the Eleventh corps on right and First corps on left of Baltimore pike, and Buford's cavalry to extend the new line leftward with as much show of force as possible. The retreat was made, in front of such odds, with considerable disorder; the two corps, coming together in Gettysburg, and choking up the streets, were much broken up when they reached the Cemetery crest. The majority of Costar's brigade was captured just as the men were reaching the Cemetery gate. Gen. Hancock, who had come from Meade at Taneytown, met Gen. Howard. Hancock, without his corps, was under instructions to assume command of the field. Every effort was made to gather in the stragglers to form the lines along the crest, and to so place the batteries that they could do most service, and these efforts were successful. Gen. Lee made one effort to turn the right flank, but encountered so prompt and so severe a fire from the batteries and from Wadsworth's division, which Hancock had located on Culp's Hill, that he checked and finally withdrew his advance, and decided to postpone further offensive efforts till the next day. The First corps, the Eleventh, and Buford's cavalry, not exceeding all told 23,000 men, having engaged nearly 40,000 at the least, had certainly done a good day's work at Gettysburg. They had fought hard, lost one-third of their numbers, and by so doing had secured an excellent defensive position, and, what was of vital importance, time enough for the scattered Army of the Potomac to come up and occupy it. Gen. Lee at the time overrated the force opposed to him on account of the vigor of its defence, and, beholding the fortification-like appearance of the new line, contented himself with what he had gained. Sickles arrived near sundown to prolong the left, and Slocum's troops were on the ground, with one division beyond Wadsworth and the other, Williams', holding the left near Ziegler's Grove. A little later than Sickles Ewell's division under Ed. Johnson came to reinforce the left of Lee's lines, which were newly formed in front of the National position.

Second Day.—As this day's operation involved nearly the whole force of both armies, it is necessary for the sake of clearness to describe in brief the ground which was to be defended by Meade and attacked by Lee. The shape of Meade's line, as finally taken, is nearly that of a fish-hook: Big Round-Top, at the left and south, is between the Emmittsburg and Taneytown roads, and is the eye of the hook. The shank runs thence north over the crest of Little Round-Top; then through lower ground, afterward gradually ascending by Ziegler's Grove, commences to bend to the east along the Cemetery Ridge; turns more still at Culp's Hill. The point touches McAllister's Mill; and Powers' Hill forms the barb of the hook. The length from eye to around to barb is 5 miles.

Gen. Meade, after having set all his troops in motion, reached the field of battle after midnight. With the earliest light he went with Gen. Howard, hastily examined the position outlined, and planned the further posting of his command. During the forenoon his army, except Sedgwick's Sixth corps, being already at hand, he sent Slocum to hold the uneven, stony, woody slopes, from Culp's Hill across Rock Creek to McAllister's Mill; Geary's division next to Wadsworth and Williams on Geary's right; Wadsworth held Culp's Hill and neighborhood; Meade left Howard's Eleventh corps where it was, Ames' division next to Wadsworth, Schurz' and Von Steinwehr's to the left in order for awhile; the remainder of Newton's First corps came next; now, nigh Ziegler's Grove, Hancock's Second was formed, Hays and Gibbon in the front, and Caldwell's near by in temporary reserve; Sickles had pushed out his Third corps to occupy the Peach Orchard, putting Humphrey's division in echelon with Gibbon, and Birney's next, so drawing back his left as to place the brigades of Graham at the angle, and of Ward back by Little Round-Top or Devil's Den, with De Trobriand's between them. Till afternoon, Sykes' corps, the Fifth, was back of Slocum's right, massed as Slocum's reserve. The artillery was posted on the heights along the lines, with a large reserve parked in rear, between the Baltimore pike and the Taneytown road. The most of Pleasanton's cavalry was on the right, well out; the left had no cavalry cover till the next day, when Merritt's brigade came. Buford's division had gone to Winchester to protect the trains and get the needed rest. Little Round-Top was occupied for a signal-station, and Big Round-Top as yet was covered only by pickets and a skirmish line. Just before the battle, Meade, finding Sickles in his judgment too far out, brought up Sykes toward Little Round-Top. The weary Sixth corps, having made 35 miles without rest, arrived about 2 P. M., and was massed in rear of the left of Meade's general line.

Meanwhile Lee had been gathering his forces in front of the same general position. Longstreet's corps held the right, making a front of two divisions; Hood's abreast of Big Round-Top, and McLaws' on his left; Pickett's had not yet reached the field; A. P. Hill occupied all the ground from McLaws' left to the Hagerstown road, Anderson and Pender in front, and Heth to their left rear in reserve. Ewell's corps, following the bend of the "fish-hook," makes a right angle with Hill's, continuing a line through the town by Main street, and extending eastward till his left is north-east of McAllister's Mill, in order of divisions from right to left, Rodes', Early's, and Johnson's. Two of Early's brigades were sent out on York pike, and faced to the east, for the purpose of protecting Lee's left flank. From the extreme right to the extreme left along Lee's line the distance was 8 miles. On the Seminary Ridge, the high knobs west of Gettysburg, and the high hills like Brenner's, east of the town, the numerous batteries of Gen. Lee were carefully located, so as to give a concentric fire. But just before the battle a number of batteries were brought together west of Little Round-Top, and within easy range of Sickles' front. The cavalry division of Stuart had returned from its raid, and was placed over against Pleasanton's cavalry to the north-east of the York road.

Meade and his generals had anticipated an attack early in the day, and in fact Lee had for a time contemplated one to be made by Ewell's corps, provided Culp's Hill could be carried without too great loss. Lee visited Ewell during the night. He found Meade's right of great natural strength, and already held in force. Lee now matured a more general plan, and determined that his main attack should be made upon Meade's *apparent* left. Longstreet's corps was to open the battle there, while Hill's was to support it. But Ewell was "to make a simultaneous demonstration, . . . to be converted into a *real attack*, should opportunity offer." It was fortunate for Meade that "the preparations for attack were not completed till the afternoon." Hood formed in two lines—Law's and Robinson's brigades in front, Benning's and G. T. Anderson's in their rear. Everything being ready, at 4 P. M. the signal-guns are slowly discharged; then all of Lee's batteries within range of the Cemetery commenced firing, but that portion concentrated near Sickles' advanced divisions made the most rapid and terrific discharges. Hood's column, skirmishers well out, was speedily set in motion. His advance was followed up by McLaws, who soon bore off from him somewhat to the left, facing Graham, De Trobriand, and Ward. The fierce musketry engagement was quickly joined. Longstreet says of this attack: "Our batteries were opened upon his (Sickles') position, Hood's division pressing upon his (Meade's) left, and McLaws upon his front. He (Sickles) was soon dislodged, and driven back upon a commanding hill (Little Round-Top), which is so precipitous and rough as to render it difficult of ascent. Numerous stone fences about its base added greatly to its strength. The enemy taking shelter behind these, held them with great pertinacity." The time covered by the phrase "was soon dislodged and driven back" was two hours and one-half; and in that time, amid a mass of rocks, in the Devil's Den and vicinity, one of the most remarkable and bloody contests of war took place —a contest which was, however, destined to end in a victory to the "driven" troops. As soon as Meade heard the signal-guns he sent to hasten Sykes, already *en route* toward Little Round-Top, and as the battle thickened he ordered Geary and Williams from his right, leaving only Green's brigade to Slocum, beyond Culp's Hill, to hold in check half of Ewell's corps. Soon Sickles, as well as Hood, was badly wounded and taken from the field. Birney replaced him. In twenty minutes after the attack his men at the Peach Orchard began to give way. Sickles' batteries, which were well posted at different points near his line, had their horses and men shot down; one battery, for example, opposite the bend in Graham's front, held on to the very last, continuing firing till the enemy reached the very muzzles of their pieces, and then retired, pulling back the guns with their prolonges. The battery commander was wounded, and 5 non-commissioned officers and 22 men put *hors-de-combat;* he remained, nevertheless, with a portion of his battery, till another from the reserve arrived to relieve him. Other batteries engaged did likewise. Birney now called earnestly for help. First Hancock, having them well in hand and ready, despatched the brigades of Caldwell to the points most needed. Supports came up just in time to drive back portions of McLaws' division, and vigorously to strike the flank of Hood.

General Warren, Meade's chief-engineer, while the contest near Devil's Den was at its height, had gone to the signal-station on Little Round-Top. Catching sight of the approaching Confederates through the trees, he called to the signal-officer to keep the flag in movement till his return, and ran over the brow of the hill, where he met a brigade of Sykes' corps on the way to Birney. From it he detached the One-hundred-and-fortieth New York regiment. About the same time, Sykes being notified, detached Vincent's brigade from Birney's division. It rushed to the left of the same stronghold. These troops promptly met the advancing Confederates, and drove back their front line; both Vincent and the commander of the One-hundred-and-fortieth New York were killed. Under this cover Hazlett's battery soon reached the heights, and was supported by Weed's brigade. Gen. Weed himself was slain, and his friend, Lieut. Hazlett, endeavoring to catch his last words, fell dead across his body. Ayres with his regulars distinguished themselves, being compelled "to fight their way front and flank to the heel of the gorge." A little farther to the right Sweitzer's and Tilton's brigades of Barnes' division were thrown into the same caldron, to come out badly maimed. Lossing says of this point: "Never was there a wilder place for combat, and never was there a combat more fierce than was seen there on that hot July evening, with blazing musketry and hand-to-hand struggles, with clubbed fire-arms and jagged stones." After the contest for Little Round-Top had lasted over half an hour, a charge from Sykes' left routed Hood's remaining troops, and sent them flying to the rear. Meanwhile Fisher's brigade of Barnes' Third division, Fifth corps, had seized Big Round-Top, threatened Hood's right and rear, and secured Meade's flank.

But the contest lasted somewhat longer opposite Humphrey, for the men of A. P. Hill's corps, who had delayed somewhat, as supporting troops do in their advance, finally struck Humphrey's division in front while the movements just described had completely turned his left flank. Little by little he withdrew his left, fighting as he did so. As he wheeled around to the rear, his right flank was the more exposed, so that he finally retired to Hancock's line and took post on his left. When the fragments of the Third corps, with all the broken reinforcements which had been sent, had come back in defeat, closely followed by the victorious Confederates, Meade caused the gap to be filled between Sykes and Gibbon. Thus, Hancock deployed Willard's brigade (and here its commander was killed), and then Doubleday's and Robinson's divisions of the First corps. These were brought in season; some of them, the Vermonters under Stannard, being located in a cluster of trees in such a way as to bring a cross- and flanking-fire upon the advancing enemy. This, with a rapid front discharge from Hancock's men, cleared that part of the field. The last movement was made by Crawford's division of Sykes' corps under Meade's personal observation. Crawford deployed his lines, gave two volleys into such troops of the enemy as were in sight, and then charged across the fields in front of Little Round-Top, and on into and beyond the wheat-field to a strip of woods.

Meade's left was now safe, for the entire Sixth corps, some of whose troops had aided in the final repulse—Wheaton's division for example—was placed in support of the Fifth corps, which we know now strongly held the Round-Tops, and Pleasanton was hastening Kilpatrick's division and Merritt's brigade of Union cavalry to guard the approaches beyond.

But Confederate Gen. Ewell had not yet carried out his instructions. He and his generals had not heard the signals; the portions of Early's division, sent out to the extreme left, promised to return for attacking Howard's front, had not come back in time; and, when finally ready, the woods and rough ground obscured everything, and Ewell could not secure unity of action between his brigades and divisions. But, after a fashion, the work was undertaken. When, late in the afternoon, on Meade's call, Williams' (now Ruger's) division (for Slocum had an added force, a wing, to command, and Williams took the Twelfth corps) had marched off, and Geary's division, though the latter lost its way by the fault of a guide, had crossed beyond Rock Creek, Gen. Green with his one brigade was getting ready to man the barricades and trenches. Then Confederate Johnson was rapidly approaching his front; Green was too late for that. Four Confederate brigades, those of Jones, Stewart, Nichols, and Walker, marched up ready to fight, but were astonished to find no foe in front. So Johnson's men worked along over the logs and stones and through the ravines till they came to the barricades. Then suddenly he met a volley from his right, and rapid continuous firing followed. Green touching Wadsworth at Culp's Hill had swung back his right till his lines, hidden by the trees, had become oblique to Johnson's. He was firing fiercely upon Jones and Nichols. It was necessary to dislodge Green, so Johnson turned and faced him, and a most angry and prolonged battle took place; Gen. Jones was slain and the Confederate dead were piled up in front of this stalwart brigade. Wadsworth and Howard rapidly reinforced Green. At 9 P. M. Johnson gave up the blind fight and contented himself with sleeping in Williams' trenches.

Before this, Gordon's brigade, returning from the Confederate left, had rejoined Early's division; and two brigades of the latter having been long in position, lying quietly under the cover of Cemetery Hill on its north side, suddenly, after a new spurt of artillery, at 7 P. M. sprang forward to assault Howard's corps. The Confederates broke through Von Gilsa's brigade, came up into the batteries and a hand-to-hand fight ensued. Reinforcements from Schurz and Von Steinwehr were turned against them, and their advance was soon broken. Gen. Hancock, catching the sound of battle, sent Howard Carroll's brigade, which, with deployed lines and a quick march, regained all the lost ground and filled out again the disordered front. In this contest Early lost a brigade commander, Col. Avery, and many men, so that he, like Ed. Johnson, was forced to give up the strife. By 10 P. M. all was quiet. Meade and his corps commanders were in council; the situation was not encouraging; the Peach-orchard was, with many dead and wounded, in Lee's hands, and Slocum had lost more than half his front by his withdrawal to help Hancock, Birney, and Sykes. Still all voted to stay and fight.

Third Day.—While the night fighting was going on, Ruger worked his way cautiously back to near McAllister's Mill. Some of his flankers wandered within Confederate Johnson's lines and were captured. At last beyond the swale he finds some breastworks not held by the enemy. He seizes them, and puts in an oblique line, like Green's, on the other side of the swale and ravine. Geary, too, by midnight, by careful marching, had come to prolong Green's oblique line; Kane's brigade next to Green, and Canby's next in order. Slocum posted between these oblique lines, supported by Lockwood's brigade and other troops sent from the Sixth corps, as much artillery as could be there used. Geary says: "All these dispositions were made with the utmost silence and secrecy, and within a few rods of the enemy's lines." From 5.30 A. M. till 10.30 A. M. a fearful struggle went on. The Confederate commander was reinforced and began to attack, when Geary and Ruger were already in motion for the same purpose. At last the advantage was with Slocum. After the last charge of the enemy, made with fresh troops, the victory of Slocum's men was so marked that they rushed forward with cheers and completely repossessed themselves of their old barricades and breastworks.

Lee's final effort may be considered in two parts: (1st.) The use of his artillery; (2d.) His infantry assault. This time he chose for his main attack not Little Round-Top, but an interval or lower land, lying between that point and Ziegler's Grove. On a ridge of slight elevation, close by the Emmittsburg road, were some 40 pieces of artillery. Farther south, on ground somewhat higher, was a larger number of guns *en masse*. For the final work Lee concentrated in this neighborhood between 140 and 150 guns. The ranges varied from 1500 to 2000 yards. Other prominent points had batteries which were calculated to divert and scatter the fire of the National guns. Opposite these Confederate cannon the Nationals had 3 groups; on Cemetery Heights, under Osborn, 50 cannon; near Ziegler's Grove, under Hazard, 30 pieces; near Little Round-Top, favorably located, 40 guns, under McGilvray; Hunt, the chief, kept the rest in reserve under shelter, for prompt relief or reinforcement.

Meade's troops to be engaged were little changed. Hancock had general supervision of the threatened points, and at least two corps under his direct command. The Second corps fell to Gibbon. The brigades occupying the lower ground in front and to the left of Ziegler's Grove, and especially exposed, were those of Smyth and Willard (Hay's division); Webb, Hall, and Heath (Harrow's division). Slightly to the left, occupying a point of woods and arranged *en potence*, was again Stannard's large brigade of Vermonters (Doubleday's division); then leftward the shattered brigades of the Third corps and those of the Fifth, all supported by a good second line, with the Sixth corps for a general reserve.

On Lee's side Pickett's division, now up from Chambersburg, was chosen as a sort of forlorn hope. It was formed in brigade lines, Kemper on the right, Garnett on the left, and Armistead in rear. The supporting force on the right rear had 3 brigades: Wilcox's, Perry's, and Wright's. On the left 6 brigades: Posey's, Mahone's, Pettigrew's, Walker's, Law's, and Scales'.

At last Lee sounded his signal-guns, two discharges distinct and clear to both armies. First began the Confederate artillery fire, mainly throwing projectiles upon the interval designated. A little later the National guns concentrated their fire upon the enemy's troublesome artillery. This fire lasted over an hour, till about 2.30 P. M. The whole region resounded as in the heaviest thunder-storm. Fragments of shells killed men everywhere. In one regiment, lying waiting, 27 were killed and wounded by one shot. All buildings in the vicinity were torn and broken; tombstones were crashed, and large numbers of horses killed outright or groaning with painful wounds. Meade stopped his guns to prevent too much heat and to preserve ammunition. Lee's shortly after followed suit. Then came the handsome Confederate advance, with flags waving in the struggling sunlight. Pickett's division went straight to its work. Our artillery opened again, making gaps which were immediately filled. The advance aimed for Ziegler's Grove. Hancock's men, with rifles in hand, covered by the stone walls and slight barricades, were quietly waiting his command. The Vermonters were ready for their oblique fire. Pickett being a little nearer, McGilvray brought his 40 guns to bear. Then instantly the whole of Hancock's front opened its musketry fire, and the choice brigades of Pickett were soon almost annihilated. Garnett was killed. Confederate Peyton, who took his place, says "that the flank fire from the Nationals was fearful, ten men being killed or wounded by a single shot." The fire and the smoke hindered any coherence, the brigades were soon mixed together, and the remnants rushed forward determined "to plant the Southern banner on the walls of the enemy." But here the fighting was soon over. Armistead had but few men left, as wounded to death he surrendered within our lines. When Armistead reached the stone wall the most part of Webb's brigade posted here abandoned their position, but did not retreat entirely, for reinforcements were at hand, coming quickly from Hall's front. There was a momentary breach, so vigorous was this last charge, but it was momentary. To lookers-on the field appeared confused; regiments sprang up and rushed out with their flags flying, gathering in prisoners and battle-memorials, and bringing in the wounded. No panorama can exaggerate the reality of that exciting scene. Crawford sums up the final work a little farther to the left of Meade's line, where some of Lee's supporting troops had wandered and fought: "By this charge of McCandless' brigade and the Eleventh Pennsylvania regiment the whole of the ground lost the previous day was retaken, together with all our wounded, who, mingled with those of the rebels, were lying uncared for." At the time of this attack our cavalry did remarkable service on our left flank, fighting on foot and preventing a turning movement in that direction from Hood. It had previously done similar work on the other flank, near the Hanover road. That night Gen. Lee withdrew behind a defensive cover arranged on the Oak or Seminary Ridge. Meade's soldiers were so weary that no vigorous effort was made to follow up the victory, so that Gen. Lee retreated in comparative security, recrossed the Potomac, and made his way back to Central Virginia.

It is difficult to ascertain Lee's losses. That his official reports (15,234 killed and wounded) are much too small there can be no doubt. Meade had 7262 wounded Confederates on his hands after the battle, and 6359 well prisoners. Lee's reported killed were 2396; his slightly wounded and missing at least 10,000; making Lee's total losses about 26,018. Maj.-Gens. Hood and Heth, Brig.-Gens. Semmes, Barksdale, Kemper, Anderson, Pettigrew, and Scales were wounded. Maj.-Gen. Pender, Brig.-Gens. Garnett, Armistead, and Jones were killed, and several general officers captured.

Meade lost 247 officers killed, 1137 wounded, and 182 captured or missing; enlisted men, 2820 killed, 13,360 wounded, 5255 captured or missing, making an aggregate of 23,001. Some of the Union officers killed were Maj.-Gen. Reynolds, Brig.-Gens. Zook and Weed, Cols. Cross, Willard, Sherrill, and Vincent; wounded, Maj.-Gens. Hancock and Sickles, Brig.-Gens. Meredith, Paul, Gibbon, Graham, Barlow, and Tyler, Cols. Stone, Wistar, and Smyth; also several were captured. (O. O. H.)

GIBBON, JOHN, an American general, was born in Pennsylvania in 1826. He graduated at West Point in 1847, and served in the Mexican war. He was afterwards employed against the Indians until the outbreak of the civil war. He was chief of artillery in Gen. McDowell's army until May, 1862, when he was made brigadier-general of volunteers. He served in the Army of the Potomac, fighting at Bull Run, South Mountain, and Antietam. He commanded a division at Fredericksburg and was wounded. He also took part at Chancellorsville, and at the battle of Gettysburg was severely wounded. On his return to service in May, 1864, he was placed in command of a division of the Second corps, and fought in the battles of the Wilderness and Cold Harbor. He afterwards commanded the Twenty-fourth army corps from the siege of Petersburg to the surrender of Gen. Lee. He received the brevet of major-general. In 1869 he was placed in command of the Seventh infantry, and he has since been engaged on frontier duty.

GIBBONS, James, an American cardinal, was born at Baltimore, July 23, 1834. His parents took him to Ireland at an early age, but in 1853 he returned to Baltimore and was educated at St. Charles College. He was ordained priest June 30, 1864, and in 1868 he was appointed vicar apostolic of North Carolina. In January, 1872, he was made bishop of Richmond, and in May, 1879, became coadjutor to Archbishop Bayley, of Baltimore, whom he succeeded in the same year. In 1883 he was called to Rome to give information of the church in America, and in 1885 he was president of the Third Plenary Council at Baltimore. In 1886 he was raised to the dignity of cardinal, being the second American who has received this honor.

GIBBS, Josiah Willard (1790–1861), an American philologist, was born at Salem, Mass., April 30, 1790. He graduated at Yale College in 1809, and was tutor there from 1811 to 1815. In 1824 he was made professor of sacred literature in the theological department, and he was also librarian of the college. He translated Storr's *Essay on the Historical Sense of the New Testament* (1817) and Gesenius' *Hebrew Lexicon of the Old Testament* (1824); he also published *Philological Studies* (1857); *Latin Analyst* (1858); and *Teutonic Etymology* (1860). He contributed to the revised edition of Webster's *Dictionary*, to W. C. Fowler's *Grammar*, and to various periodicals. He died at New Haven, March 25, 1861.

GIBBS, Oliver Wolcott, an American chemist, was born at New York, Feb. 21, 1822. He graduated at Columbia College in 1841, and studied chemistry with Prof. Hare at Philadelphia, and medicine at the New York College of Physicians and Surgeons, receiving his degree in 1844. He afterwards studied in Europe under Liebig, and in 1849 was elected professor of chemistry and physics in the New York Free Academy. In 1863 he was called to Harvard College as professor of chemistry. He was appointed by Pres. Grant scientific commissioner to the Vienna Exhibition in 1873. He has contributed to the *American Journal of Science* and other periodicals, and has received marks of honor from European societies.

GIDDINGS, Joshua Reed (1795–1864), an American statesman, was born at Tioga Point, Pa., Oct. 6, 1795. When he was ten years old his parents removed to Ashtabula county, Ohio. After Gen. Hull's surrender at Detroit in 1812, Giddings enlisted as a volunteer and fought in some engagements with the Indians. He afterwards taught school, then studied law with Elisha Whittlesey, and was admitted to the bar in 1820. He was elected to the Ohio legislature in 1826 and to Congress in 1839, having already acquired a high reputation in his profession. Just before he entered Congress the "Atherton gag" had been passed, which refused to allow any consideration of petitions or papers on the subject of slavery. Giddings at once joined John Quincy Adams' efforts to have the right of petition restored and maintained. A close scrutiny of the Constitution led him to the conclusion that Congress had power to prohibit slavery in the Territories and in the District of Columbia. As a local institution in certain States Congress could not interfere with it, but was under no obligation to countenance or foster it. He therefore opposed the war in Florida on the ground that it was simply an effort to use the U. S. army to catch fugitive slaves. In 1841 some slaves, who were being carried in the Creole, an American vessel, from Virginia to New Orleans, overpowered the crew and took the vessel into the British port of Nassau, N. P., where they were declared free. Daniel Webster, then secretary of state, demanded compensation from the British government. Giddings, in the House of Representatives, March 21, 1842, offered resolutions, declaring that the escaped slaves had exercised their natural rights, and that no wrong had been done for which compensation could be demanded. Great excitement ensued, and, though he withdrew the resolutions at the request of friends, a vote of censure was passed upon him by a vote of 125 to 69. He immediately resigned, and, returning to his constituents, was re-elected by an increased majority. Confirmed in his hostility to the system of slavery, he resisted all its encroachments. He opposed the annexation of Texas as increasing the slave domain. He had acted with the Whigs in favoring a protective tariff, but in 1847 he refused to vote for the Whig candidate for the speaker of the House, and in 1848 he assisted in forming the Liberty party at Buffalo. In 1849 he again refused to vote for R. C. Winthrop for speaker, and thus caused his defeat. Slavery was still the great question of the time, and Giddings steadfastly opposed the compromise measures of Clay, as he did afterwards the Kansas-Nebraska measures of Douglas. In 1856 he was senior member of the House, and as such administered the oath to N. P. Banks, the Republican candidate, who had been elected speaker after a struggle prolonged through two months. Though originally a man of powerful frame, Giddings was now worn out with his excessive toil on behalf of freedom. On May 8, 1856, while addressing the House, he fell to the floor unconscious, and though then he soon revived, he fell again on Jan. 17, 1858. He was compelled to refrain from attendance for some time, and closed his congressional career in 1859. In 1861 he was appointed by President Lincoln consul-general to Canada. He died at Montreal, May 27, 1864. He published a volume of *Speeches* (1853); *The Exiles of Florida* (1858); *Congressional History of Slavery*, and *The Rebellion, its Authors and Causes* (1864).

GIFFORD, Robert Swain, an American painter, was born on the island of Naushon, Mass., Dec. 23, 1840. His parents soon after removed to New Bedford, where he was educated. He studied painting with Albert Van Beest in New York, and in 1864 opened a studio in Boston, but returned to New York in 1866. He was elected an associate of the National Academy in 1867 and an academician in 1878. He visited Oregon and California in 1869, and went to Europe in 1870. In 1874 he went to Algiers and the Great Desert, and also made a tour through France. His works comprise a wide variety of scene, and are marked by vigor and fine execution. Among his best are Mount Hood, Oregon (1870); Boats on the Nile (1874); Egyptian Caravan (1876); Cedars of New England (1877); Border of the Desert (1878). He has also painted many water-colors and illustrated many fine books. He was president of the New York Etching Club.

GIFFORD, Sanford Rogers (1823–1880), an American painter, was born at Greenfield, Saratoga co., N. Y., July 10, 1823. He studied at Brown University, but in 1844 left college to study art in New York. In 1851 he was made an associate of the National Academy, and in 1854 became an academician. He spent the summers of 1855–57 in sketching tours in Europe. He served with the N. Y. Seventh regiment in the civil war. In 1868 he again visited Europe, and in 1870 went to the Rocky Mountains. He died Aug. 29, 1880. His works show great vigor of style and strong sense of color. They aim at an interpretation of the inner sense of nature and are often successful in their object. Among them are Morning in the Adirondacks, San Giorgio, Venice, Venetian Sails, Coming Storm, Lake Geneva, Golden Horn.

GIGNOUX, François Regis, a French painter, was born at Lyons in 1816. He studied art at Paris under Delaroche and others. He removed to America in 1840, settling in New York and devoting himself to landscape. In 1851 he was chosen to the Academy of Design, and he was the first president of the Brooklyn Art Academy. In 1870 he returned to France. Among his works are Virginia in Indian Summer, The Four Seasons in America, Niagara in Winter, The Dismal Swamp. His winter landscapes have attracted most attention, but he has depicted with success every aspect of American scenery.

GIGOUX, Jean François, a French painter, was born at Besançon in 1806. He studied at the École des Beaux Arts, and exhibited his first picture in 1831. He devoted himself chiefly to historical and sacred subjects, but has also painted portraits. Among his works are The Death of Cleopatra (1850), The Baptism of Christ, Taking of Ghent, The Last Ecstacy of St. Mary Magdalene. He has been especially successful in his decorations of churches.

GILBERT, Joseph Henry, an English chemist, was born at Hull, Aug. 1, 1817. His mother is known to literature as Ann Taylor, of Ongar. He was educated at Glasgow University, at University College, London, and at Giessen, studying under Graham, A. T. Thomson, Thomas Thomson, and Liebig. He took his doctorate at Giessen, was an instructor in University College, London, 1840–41, and for a time was employed in the Manchester College of Calico-printing. Since 1843 he has been associated with Mr. Lawes (now Sir J. B. Lawes), of Rothamsted, Herts, in a systematic course of experiments and researches in agricultural chemistry, and in the physiology of farm animals. The results of these studies have been given to the world in a long series of papers, everywhere recognized as of the highest value, both to agriculture and to pure science.

GILBERT, William Schwenck, an English dramatist, was born at London, Nov. 18, 1836. He was educated at Great Ealing School, and received the degree of B. A. from the London University in 1857. He was then employed as a clerk in the privy council office, and was admitted to the bar in 1864. He became a frequent contributor to *Punch* and *Fun*, his verses in the latter being afterwards collected as the *Bab Ballads*. He then turned his attention to writing for the stage; his burlesques, *Dulcamara*, *La Vivandière*, and others, had some success. Then a musical legend, *Ages Ago*, produced in 1868 by Gilbert and F. Clay, gave intimation of the new line of entertainment with which his name is connected. Meantime he produced his first comedy. *An Old Score*, as well as *Pygmalion and Galatea*, and several fairy plays. In 1876 came his comic opera *Trial by Jury*. in which he associated for the first time with Arthur Sullivan. Their joint work was seen again in *The Sorcerer*, and in 1878 they charmed the world with their *H. M. S. Pinafore*, which playfully hit off certain popular foibles. Encouraged by its extraordinary success in the United States, the authors brought out their next work, *The Pirates of Penzance*, in New York, in 1880; but, though well received, it did not attain the popularity of its predecessor. *Patience* followed in 1881, *Iolanthe* in 1883, and the *Mikado* in 1885.

GILDER, William Henry (1812–1864), an American educator, was born in Philadelphia, Sept. 17, 1812. His father, John Gilder (1786–1855), was a leading Methodist layman of that city, served both in the city council and in the State legislature, and was chairman of the building committee of Girard College. The son was educated at Wesleyan University, Connecticut, and entered the Methodist ministry in 1833. He was for a time editor of a Philadelphia literary paper, *The Repository*, and afterwards of *The Literary Register*. He established a young ladies' school at Bordentown, N. J., and was afterwards president of the Female Institute at Flushing, Long Island. In 1862 he entered the army as chaplain of the Fortieth New York volunteers. He died of disease contracted in the discharge of his duty, at Brandy Station, Va., April 13, 1864.

His son, **William Henry Gilder**, journalist and Arctic traveller, was born in Philadelphia, Aug. 16, 1838. He entered the Union army as a private at the beginning of the civil war, and was a captain (major by brevet) at its close. In Lieut. F. Schwatka's search for Sir John Franklin relics in King William's Land (1878–80), he was *New York Herald* correspondent and second in command. Again he accompanied the Rodgers in St. Lawrence Bay, and joined in the search for the bodies of De Long and his companions in the Lena Delta. He served as correspondent of the *Herald* during the Franco-Chinese war in Tonquin (1883). He is the author of *Schwatka's Search* (1881), and *Ice-Pack and Tundra* (1883), the latter being an account of the search for the Jeannette.

Another son, **Richard Watson Gilder**, editor and poet, was born at Bordentown, N. J., Feb. 8, 1844. He early became a journalist, and in 1869 was editor of *Hours at Home*. In 1870 he became associate editor of *Scribner's Monthly*, into which *Hours at Home* was merged; and when, in 1881, the title of *Scribner's* was changed to the *Century Magazine*, he succeeded Dr. Holland as its editor-in-chief. Under his management it has been noted for its literary and artistic excellence. Mr. Gilder has published three books of poems: *The New Day* (1875), *The Poet and his Master* (1878), and *Lyrics* (1885).

Jeannette Leonard Gilder, born at Flushing, Long Island, Oct. 3, 1849, and **Joseph B. Gilder**, born June 29, 1858, are also journalists. In January, 1881, they established *The Critic*, New York, which they have since edited.

GILDERSLEEVE, Basil Lanneau, an American classical scholar and author, was born at Charleston, S. C., Oct. 23, 1831. He was educated at Charleston and Princeton Colleges, and graduated at the latter in 1849. He pursued further philological studies at Berlin, Bonn, and Göttingen, receiving the degree of Ph. D. at the last named in 1853. He was made professor of Greek in the University of Virginia in 1856, and, after holding this position twenty years, he was called, at the opening of Johns-Hopkins University, Baltimore, to a similar professorship. He has published a series of Latin school-books, including a *Grammar* (1867; revised edition, 1872); and editions of *Persius* (1875); *Justin Martyr* (1877); Pindar's *Olympian and Pythian Odes* (1885). He has been editor of the *American Journal of Philology* since 1880. He received the degree of LL.D. from William and Mary College in 1869.

GILES, Henry, an American lecturer and essayist, was born at Cranford, county Wexford, Ireland, Nov. 1, 1809. He was educated at Belfast, in the Roman Catholic faith, but after various changes of belief became a Unitarian. He was pastor of a congregation at Greenock for two years, and at Liverpool for three years. In 1840 he came to the United States, where he was chiefly engaged as a lecturer, though he also preached in several parishes. He has published *Lectures and Essays* (1843); *Christian Thoughts on Life* (1850); *Illustrations of Genius* (1854); *Human Life in Shakespeare* (1868). In later years he has lived in retirement on account of ill-health.

GILES, William Branch (1762–1830), an American statesman, was born in Amelia co., Va., Aug. 12, 1762. He was educated at Princeton College, N. J., studied law with Chancellor Wythe, and was admitted to the bar at Petersburg. In 1790 he was elected to Congress to fill a vacancy, and he was often re-elected. In December, 1792, he led the attack on Alexander Hamilton's management of the treasury, calling for a complete exposition of the finances, and pointing out a discrepancy of $1,500,000 in the public accounts. Hamilton replied promptly and satisfactorily to every question, and Giles' resolutions of censure on Jan. 23, 1793, were defeated by a large majority. In 1796 he followed Madison in opposing an appropriation to carry into effect Jay's treaty with England. In 1798 he opposed the movement for war against France on account of her depredations on American commerce. He assisted Madison in procuring the passage in the Virginia legislature of the celebrated resolutions of 1798. In 1804 Giles was elected to the National Senate, where he was leader of the Republican party until 1811, when his opposition to the movement for war against England and his feud with Pres. Madison threw him into the background. In 1815 he retired to private life. In 1826 he opposed a revision of the Constitution of Virginia, and was elected first to the legislature and then to the governorship. The project for revision, however, prevailed in 1828, and Giles was prominent in the debates of the Constitutional Convention. He died in Amelia co., Va., Dec. 4, 1830.

GILL, Theodore Nicholas, an American naturalist, was born in New York city, March 21, 1837; was educated in private schools, and has received honorary degrees of Ph. D. and M. D. Dr. Gill has earned a wide reputation as an ichthyologist, and has also given special attention to mammals, reptiles, crustaceans, and mollusks. For many years he has been employed in the Smithsonian Institution, which has published many of his scientific papers. He is one of the most accurate and trustworthy of American systematists, and his varied accomplishments as a man of science are widely recognized in other countries.

GILLEM, Alvan C. (1830–1875), an American general, was born in Tennessee in 1830. He graduated at West Point in 1851 and entered the artillery service, served in Florida and in garrison and frontier duty until 1861, when he was made captain and assistant-quartermaster. He was engaged at Mill Spring, Shiloh, and Corinth. In May, 1862, he was appointed colonel; in August, 1863, brigadier-general. He was then made adjutant-general of the State of Tennessee, and commanded an expedition in East Tennessee from August, 1864, to March, 1865. He was president of the convention to reorganize the State of Tennessee, Jan. 9, 1865. He afterwards captured Salisbury, N. C., in April, 1865, for which he received the brevet of major-general. In 1867 he commanded the district of Mississippi, and afterwards had commands in the regular army. He was actively engaged against the Indians and was conspicuous in the pursuit of the Modocs in 1873. He died Dec. 2, 1875.

GILLENIA. This plant is best known under its botanical name, though also called "Indian Physic," "Bowman's Root," or "Wild Ipecac." It was employed by the Indians in strong decoctions which operated violently. In small doses it was formerly used as a tonic, and for a long time was considered equal in value to the officinal ipecacuana. The roots were collected in the fall, and the bark only used.

Linnæus and others regarded the plant as a *Spirœa;* but Conrad Moench, a German botanist, discerned its distinct character, and in 1802 named the genus in honor of Dr. Arnold Gillen, a botanist of Cassel. It is distinguished from *Spirœa* readily by its general appearance, and critically by its funnel-shaped calyx, very short stamens, and five carpels combined into a five-celled capsule, with two seeds in each cell. There are only two species known, both natives of the eastern slope of the United States. *Gillenia trifoliata* is distinguished by the narrow pointed stipules from *Gillenia stipulacea*, which has large ovate stipules deeply cut. They grow in rich woods, and, though not often found in great abundance in any one spot, each species is very generally scattered over the area in which it is located.

GILLETT, Ezra Hall (1823–1875), an American clergyman, was born at Colchester, Conn., July 15, 1823. He graduated at Yale College in 1841, and at the Union Theological Seminary in 1844. He was ordained pastor of a Presbyterian church at Harlem in 1845, and gave considerable attention to church history. He published *Life and Times of John Huss* (2 vols., 1861; 3d ed., 1870), and at the request of the Presbyterian Church (New School) prepared an excellent *History of the Presbyterian Church in the United States* (2 vols., 1864; revised ed., 1873). In 1868 he was appointed professor of political economy and history in the University of New York. He died at New York, Sept. 2, 1875. Besides the works mentioned above he published *Ancient Cities*, *England 200 Years Ago*, *Life Lessons*, *God in Human Thought*, and *The Moral System* (1875).

GILLMORE, Quincy Adams, an American general and engineer, was born at Black River, Lorain co., Ohio, Feb. 28, 1825. Graduating at West Point in 1849 at the head of his class, he served three years as assistant engineer in construction of works at Hampton Roads, Va., then became assistant professor of engineering at West Point. He had attained the rank of captain in August, 1861, when he was appointed chief engineer of the expedition to Port Royal, under Gen. T. W. Sherman. He conducted the siege of Fort Pulaski, at the mouth of the Savannah River, and compelled its surrender, after bombardment, on April 11, 1862. In August following Gen. Gillmore held a command in Kentucky, and in January, 1863, he defeated Gen. Pegram, at Somerset. In June he was placed in command of the Department of the South, with the rank of major-general, and thereafter conducted the siege of Charleston, S. C. He effected the capture of Fort Wagner, and the demolition of Fort Sumter. He was transferred to the James River in 1864, where he commanded the Tenth army corps, and was engaged in the battle of Drury's Bluff. He was summoned to Washington in July, when it was threatened by Gen. J. A. Early. In November, 1864, he again had command of the Department of the South, and afterwards had charge of the construction of various fortifications on the Atlantic coast, and in June, 1868, was promoted to be major, and in January, 1874, to be lieutenant-colonel of engineers. He has published *Siege and Reduction of Fort Pulaski* (1863); *Practical Treatise on Limes, Hydraulic Cements, and Mortars* (1863); *Engineer and Artillery Operations Against the Defences of Charleston Harbor in* 1863 (1865).

GILMAN, Daniel Coit, an American educator and author, was born at Norwich, Conn., July 6, 1831. He graduated at Yale College in 1852, and was superintendent of schools in New Haven, Conn., from 1856 to 1860. He was then appointed professor of physical geography and librarian at Yale College, which positions he held till 1872, being also for two years State superintendent of schools in Connecticut. In 1872 he was called to be president of the University of California, and on the organization of Johns-Hopkins University, at Baltimore, in 1875, was made its president. He has written numerous educational reports, and literary and historical papers. He has also published a *Life of James Monroe* (1883).

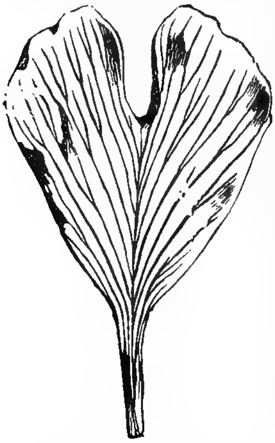
GILMAN, Samuel (1791–1858), an American clergyman, was born at Gloucester, Mass., Feb. 16, 1791. He graduated at Harvard College in 1811, and was tutor there from 1817 to 1819. He became pastor of the Unitarian church in Charleston, S. C., in December, 1819, and held this relation till his death, which occurred at Kingston, Mass., Feb. 9, 1858. From his writings in the *North American Review* and other periodicals a volume was collected, called *Contributions to American Literature* (1856). He also published *Memoirs of a New England Choir*, and some poems, and translated Boileau's *Satires*. He was an active promoter of the cause of temperance.

His wife, Caroline H. Gilman (1794–1866), was the daughter of Samuel Howard, of Boston, and was born Oct. 8, 1794. At the age of sixteen she wrote religious poems, which were published in the *North American Review*. In 1819 she was married, and removed to Charleston. In 1832 she began to edit the *Rosebud*, a juvenile weekly, afterwards called the *Southern Rose*. From this she afterwards compiled *Recollections of a New England Housekeeper*, *Recollec-*

tions of a Southern Matron, and other books. She also published *Oracles from the Poets* (1847), *The Sibyl* (1848), *Verses of a Lifetime* (1849), and contributed to Mrs. Ellett's *Women of the Revolution.* After the death of her husband, she took up her residence in Cambridge, Mass., where she died in 1866.

GILMORE, JOHN R., an American author, was born at Boston, Mass., in 1823. He was trained to business, and became head of a New York firm engaged in the Southern coast-wise trade. On retiring, in 1857, he devoted himself to literature. He assisted in founding the *Continental Monthly*, in 1862. He has published, chiefly under the name "Edmund Kirke," several volumes relating to Southern life, among which are *Among the Pines*, *My Southern Friends*, *Down in Tennessee*, *On the Border*, *Among the Guerrillas.* He is also the author of a *Life of Jesus*, and has contributed to various periodicals.

GINGKO, or MAIDEN-HAIR TREE, was introduced from Japan. The name is said by Veitch to be of Chinese origin, and to signify "deciduous;" the tree, unlike most *Coniferæ*, losing its leaves in the winter season. It has been found cultivated in both China and Japan, but nowhere indigenous. The Chinese name attached to the tree in Japan would seem to indicate that the first knowledge of the tree in Japan was derived from China. It is generally cultivated in those countries for the sake of the nuts, which are about the size of a filbert, and when roasted in the shell have the flavor of almonds, and are so highly esteemed as to be rarely absent from first-class entertainments. Many travellers speak of the tree's immense size. Bunge is quoted by Hoopes as noting one near Pekin which was forty feet in circumference, and of "prodigious height." Wood from Japan exhibited at the Centennial Exhibition of 1876 was yellowish-white in color, and of such a uniform satiny texture that only by the aid of a pocket-lens could the lines of annual growth be detected. These lines averaged a quarter of an inch apart.


Leaf of Gingko Tree.

This curious tree was made known to Europeans about the beginning of the eighteenth century, through the writings of Kaempfer, but Ellis, in a letter to Linnæus (as published in *Smith's Correspondence*), dated April, 1758, notes it as then being propagated by James Gordon, a nurseryman near London, and botanical chronology fixes 1754 as the date of its introduction to England. This original tree was propagated by layers and cuttings in the absence of seeds, and proved to be a male tree; and it is only in comparatively recent times, probably through seeds from the original countries giving other trees, that fruiting plants have been known in England. The tree is believed in Europe to be diœcious—having males and females on separate trees. In France, where the tree is popularly known as "*L'arbre aux quarante écus*," in consequence of a sharp trick by which the original introducer to that country obtained the first plant from an English tradesman, it is noted by Delile, in *Bull. de la Société ag. du Hérault* for 1835, as having first produced fruit in that part of the world at that time. According to Hoopes (*Book of Evergreens*), it was introduced to America by Alexander Hamilton (no doubt by error for William Hamilton), of Woodlands, near Philadelphia, in 1784. This tree is still standing, and is probably 100 feet high. There are also very large trees in many parts of the United States. The tree is described in most European works as having a conical or pyramidal head, and the early trees—male—from the European original are of that character; but during recent years a number of seedling trees have borne fruit in America, and these have heads spreading like that of an oak. This is the case especially with one growing in the grounds of the Landreths, Bloomsdale, near Philadelphia. These bearing trees are often isolated, and show the two sexes on the same tree. In these examples, at least, the gingko is polygamous, not diœcious, and the genus is not therefore an exception in this respect to *Coniferæ* in general. The yellowish pulp which covers the nut has the odor of rancid butter. It is said to possess considerable astringency. There seem to be no trustworthy records as to the value of the timber. The tree is, however, of immensely rapid growth, and if cheap methods of propagating it were at hand it might become an important tree in American forestry. Even in France, where trees usually grow in a less ratio, a tree planted at Montpelier, in 1788, had reached 52 feet in 1835. Near Philadelphia, the writer has noted 3 feet as a common growth in one year, and a few cases of 5 feet have come under his observation.

In classification the native name "Gingko," as given by Kaempfer, was adopted as the botanical name by Linnæus; but Sir J. E. Smith, in a paper published in the Linnæan Society's *Transactions* for 1796, rejected the name as "barbarous;" and as Mr. R. A. Salisbury, an active member of the Linnæan Society, had recently taken the ground that all names ought to be descriptive, concluded to charge the name from *Gingko biloba* to *Salisburia adiantifolia*, the leaves being merely split down the middle and not bilobed in the strict botanical sense of the word. But these reasons for changing names are not regarded as legitimate by modern botanists, and under the law of priority *Gingko biloba* prevails. Its place in systematic botany is among the Taxineous section of *Coniferæ*, and near the genus *Taxus*, which includes the common yew. In the yew the upper portion of the pedicle enlarges and makes a coral-like cup around the seed. In *Gingko* the seed is wholly enveloped by the orange-colored fleshy covering. The flowers appear in the spring with the leaves, or slightly in advance of them, the male-flowers in narrow catkins, between one and two inches in length, the female in pairs on short peduncles.

It is quite probable that but for the cultivation given it by the people of China and Japan it would have wholly disappeared. A large number of species are found in a fossil condition in the Miocene period, and this one alone is left to modern times, with no very close relation to existing genera. (T. M.)

GINSENG, the root of certain species of *Panax*, largely used in China as a medicine. An American species (*Panax quinquefolium*) now furnishes much of the supply of this article. Its root has been exported to China since colonial times, the export, of late years, being from about 400,000 to 500,000 lbs. yearly. The plant is a perennial herb, found in shady mountain woods from Canada to Carolina. It bears compound leaves of five leaflets, and yellowish-green or white flowers, in a many-flowered umbel. The fruit is a two-celled succulent drupe, of a shining crimson when mature. The root, which is imagined to bear some resemblance to the human form, is slightly stimulant and rather pleasantly aromatic. Its medicinal virtues are very slight, and it is seldom or never prescribed by American physicians. Yet it is highly esteemed in China and Tartary, and enters into nearly every medicine there used. The Chinese consider their native drug the best; Corean ranks second, then American, and last Japanese. In the *U. S. Consular Reports* for October, 1884, a full account of the trade may be found.

See Vol. X. p. 539 Am. ed. (p. 605 Edin. ed.).

See Vol. X. p. 554 Am. ed. (p. 621 Edin. ed.).

GIRARD COLLEGE.—Stephen Girard, a wealthy merchant of Philadelphia, born at Bordeaux, May 20, 1750, died Dec. 26, 1831, having by his will and codicil left his large estate to the city of Philadelphia in trust for the foundation of a college for poor white male orphans. The executors had so far succeeded in the settlement of the estate that early in 1833 they were able to turn over to the city councils sufficient funds to enable them to carry out his intention. Accordingly, on Feb. 11, 1833, the councils elected a board of directors, consisting of 18 prominent citizens, Nicholas Biddle being chairman, to superintend the organization and management of the college in conformity with his will. The councils also, on March 21, appointed a sub-committee of their body, to be called the "building committee," who with eight members of the board of directors and an architect were instructed to prepare a plan for the college buildings. Mr. Thomas U. Walter, the architect employed (who is still living), prepared the plan in accordance with directions laid down in the will of Mr. Girard. This design, substantially the present edifice, was approved by councils on April 29; the excavations for the foundation were begun on May 6, and the corner-stone was laid on July 4, 1833.

The college is erected on high ground in the northwestern part of the city of Philadelphia. A tract of 45 acres is devoted to the purpose of the college and is surrounded by a wall 10 feet high, built of gneiss rock, capped with marble slabs. The college building and three out-buildings were completed on the 13th of November, 1847, at a cost of $1,953,821.78, and transferred by the "building committee" to the board of directors. On Dec. 15, 1847, Hon. Joel Jones was elected president. On Jan. 1, 1848, the college was formally opened, with appropriate ceremonies, with a class of 100 orphan boys. There were admitted on Oct. 1 of the same year 100 additional boys, and on April 1, 1849, another class of 100 boys. Since that time, as the income would permit, other buildings have been erected, and additional boys admitted, till there were in February, 1886, within the walls of the college, enjoying the advantages it affords, 1134 boys.

The buildings now number eleven, exclusive of the college building. These are used as dormitories, residences, an infirmary, a chapel, an engine-house, and a mechanical department.

The Pupils.—An orphan is defined by the law of Pennsylvania to be a "fatherless child." The applicant for admission must be a "poor white male orphan," who is above the age of six and under ten years, and who is destitute of means, and without relatives able to maintain and educate him. By the will of Mr. Girard preference is given as follows: 1. To children born in the city of Philadelphia. 2. To those born in the State of Pennsylvania. 3. To those born in the city of New York. 4. To those born in the city of New Orleans. On entering, the orphans are indentured to the college. They are boarded and educated in the college, and are clothed in the prevailing style at the time, each boy, in the spring and fall, being measured for his suit. No distinctive dress is permitted.

The annual cost of maintaining, clothing, and educating each pupil, including current repairs to buildings and furniture and care of grounds, is about $312.

The daily routine of duty is as follows:

6 A. M.	Arise	12.30 P.M. to 1	Dinner.
6.30	Breakfast.	1 to 2	Play-ground.
7 to 7.30	Play-ground.	2 to 4	School.
7.30 to 8	Section-room.	4 to 4.15	Evening chapel.
8	Morning chapel.	4.15 to 6	Play-ground.
8.15 to 10	School.	6 to 6.30	Supper.
10 to 10.15	Recess.	6.30 to 7	Play-ground.
10.15 to 12	School.	7 to 8.30	Study hour.
12 to 12.30	Play-ground.	8.45	Retire.

The officers of the college are a president and a vice-president. The officers of instruction consist of 4 professors and 42 teachers. There are 12 prefects and 14 governesses. These officers prevent disorder, and are at hand to attend to any boy who may be taken sick during the night.

Schools.—The schools are divided into four grades. In the primary children begin with the alphabet. The boys are taught all the branches of a sound English education. In the fourth school the studies correspond to those of high schools. Boys are promoted by merit from one grade to a higher, twice in each year, at the end of the school term.

The department of natural history is liberally supplied with stuffed birds and animals, a cabinet of minerals and fossils, diagrams and models for teaching zoölogy and physiology. The department of chemistry and physics is amply supplied with apparatus for experiments and illustrations. In connection with this department is a technical school, in which about 300 of the older pupils receive instruction. This department of instruction was begun in April, 1882. The experiment was so satisfactory that the board of directors decided to erect a building in which it could be properly carried out. This building was completed in 1884. It was supplied with steam and equipped with the necessary tools and machinery at a cost of about $93.000. Since then a forge has been added, and accommodations for casting materials desired for use in this department. Mechanical drawing is taught here also. The pupil is taught to make a drawing for his proposed casting. In the wood-working department he is taught to make a model. He is then taught moulding, casting, chipping, filing, and scraping. The accommodations are sufficient to make a casting of 500 pounds weight. The boys have made several small engines in this department. In the wood-working department boys are taught to plane, saw, mitre, dovetail, and to make patterns. The pupils attend this department, on an average, 6 hours per week.

There is a battalion of 4 companies, consisting of about 200 of the larger and older boys of the college, and officered by them. They are under a competent instructor, who conducts a drill 4 afternoons in the week after 4 P. M., and a battalion drill every Friday afternoon from May 20 to Nov. 1, except during the months of July and August. A band of 25 pieces, and a drum-corps of 12, composed of the pupils, also have their instructor. Boys of the 3 lower schools receive instruction in vocal music every afternoon in the week except Saturday.

Care-taking.—A resident physician has charge of the infirmary. The death-rate from sickness amounts to about 4 in 1000. When a boy is seriously ill his mother or guardian is notified of it and they are allowed to visit him freely. A dentist is employed one day in each week to attend to the teeth of the boys.

A steward has charge of the purchase of food, clothing, and other necessities; also of the laborers employed in the care of the grounds and buildings. The matron, who has two assistants, has charge of the house-keeping, household supplies, ordering of meals, care of servants, and the multitude of things that usually fall upon a house-keeper. The architect employed is a graduate of the college. A gardener has charge of the trees, ornamentation of the grounds in summer, and of the green-house.

There is a shoe-room, in which some of the pupils are employed and in which the shoes of the boys are soled and mended. Some shoes are made in this department. There is a bakery, in which all the bread used on the premises is baked; a steam-laundry, where the clothes are washed and mangled. The buildings are heated by steam which is conveyed in pipes from the engine-room through a large underground tunnel, and the heat comes from the cellars to the different rooms by means of registers.

As directed by the will of Mr. Girard the food is plain, well cooked, and nutritious. It is served in two large dining-rooms—the one for the younger pupils seating about 350, that for the older boys about 800. Grace is said by an officer before each meal. The meals are inspected daily by the president and vice-president. There is a lavatory in each dormitory. A pool in the cellar serves for the use of the boys for bathing during the winter and cool months. A large pool is located in one corner of the grounds in a depressed place sheltered from observation outside and inside of the enclosure, where the boys bathe and swim during the warm months. Every boy is taught to swim. Amusements are furnished at intervals during the winter months. Lantern-slide exhibitions, legerdemain, singing and oratorical exercises are selected with a view to amuse and entertain all the boys, the small as well as the large ones. They are held in the chapel building, the only assembly-room provided for all occasions. On Sundays the boys are assembled in their section-rooms at 9 A. M. and 2 P. M. for religious reading and instruction. They are taught the Lord's Prayer, the Ten Commandments, and passages of Scripture. At 10.30 A. M. and 3 P. M. they assemble in chapel for religious services, which are conducted by the president or a layman selected by him, or by the vice-president. The exercises consist of reading from the manual prepared by a committee of the board of directors, prayer, singing of hymns, reading of the Scriptures, and an address of a non-sectarian character.

Regulations.—The following extract from Mr. Girard's will is noteworthy:

> "I enjoin and require that no ecclesiastic, missionary, or minister of any sect whatever shall ever hold or exercise any station or duty whatever in the said college; nor shall any such person ever be admitted for any purpose or as a visitor within the premises appropriated to the purposes of the said college. My desire is, that all the instructors and teachers in the college shall take pains to instil into the minds of the scholars the purest principles of morality, so that, on their entrance into active life, they may from inclination and habit evince benevolence toward their fellow-creatures, and a love of truth, sobriety, and industry, adopting at the same time such religious tenets as their matured reason may enable them to prefer."

By a law of the college boys are permitted to visit their homes in the city on a day set apart for this purpose once in three months. This day is known as the "third Wednesday holiday." The mothers and guardians are permitted to visit their boys in the college one half-day once in three months. This occurs on a Tuesday afternoon, and the schools are closed for this purpose. This is known as "mothers' day." Boys earning the privilege by good behavior are permitted to visit their homes on Saturday afternoons, there being no school on that day after 10 A. M. They are also permitted to go home on legal holidays.

Stephen Girard's birthday, May 20, is appropriately celebrated on the college grounds. The exercises are participated in by the board of directors and invited guests, the officers and teachers, the alumni of the college, and the pupils. There is a collation at 1 P. M. in the main dining-room, followed by a few short addresses. The alumni celebrate the day with appropriate exercises in the chapel, and the day concludes with a battalion drill of the pupils, which is witnessed by from three to four thousand people.

Schools close July 3 and open again on Sept. 5. In the interval one-half of the teachers and household officers take a vacation of one month, when they return and permit the other portion who have been on duty with the boys during the time to take their vacation. Boys are not required to study during this period. They spend their mornings till 10 A. M. on the playground, and then assemble in chapel for morning prayer, after which they go to their school-rooms and remain till 12. They assemble again at 2 P. M. and remain till 4 P. M., when they go to evening prayer.

A boy whose parent or guardian applies for and agrees to take him out of the city is granted two weeks' leave of absence from July 29. There is usually an annual picnic one day in the month of July, when the boys spend the day on the Wissahickon, a beautiful stream, about 4 miles from the college. There is also an excursion-day in August to the seaside for a day's sport.

A well-selected library of upwards of 9000 volumes has been collected at the college. Upon the tables are to be found nearly all the prominent magazines and reviews published in the United States and in England. The library is opened on Monday and Thursday afternoons after school hours, and on Saturday morning for the use of the officers and older pupils.

The discipline of the college is almost entirely administered through admonition and deprivation of privileges: in extreme cases corporal punishment may be inflicted by order of the president and in his presence. For continued misconduct, a pupil becoming an unfit companion for others, the right to dismiss him summarily is vested in the board of directors by the will of Mr. Girard.

Boys are discharged by binding them out to trades or other occupations or by cancelling their indentures. By the will of Mr. Girard they are to be bound out between the ages of 14 and 18 years. When a boy finally leaves the college he receives an outfit of clothing of the value of $50. An officer is employed to find employment for the boys, to attend to their proper indenture, and to see that they are fairly treated in their positions. The total number of persons employed in the household on Jan. 31, 1886, was 234.

The Girard Estates.—The real estate by which this magnificent charity is supported is located in the city of Philadelphia, Schuylkill and Columbia counties. The total value of the residuary fund, Dec. 31, 1884, is stated in the report of the board of directors at $10,338,929.88. The gross revenue for the year was $949,380.47. The total payment for the college, $474,774.62. The real estate in Philadelphia includes banking houses, dwellings, stores, wharves, and farms; in Schuylkill and Columbia counties there are also 20,000 acres; the remainder of the estate is in stocks and loans. Coal is mined from the Girard estate under leases of 15 years of the right to mine coal at a fixed rate per ton. The mining is done by the lessee and the royalty is paid the city of Philadelphia, trustee, at the end of each month. The quantity of coal mined from the Girard estate to the end of the year 1883 was 16,953,196 tons. The quantity of coal mined annually from this estate is now 1,500,000 gross tons. The gross revenue derived from the royalty on coal mined is $500,000 annually. One coal seam, the Mammoth vein, has a thickness of 50 feet. (See COAL in Vol. II.)

The board of directors of city trusts has charge of the estate. Twelve of them are appointed by the judges of the courts and serve without remuneration. The mayor of Philadelphia and the presidents of the city councils are also *ex-officio* members of the board.

Presidents.—Alexander Dallas Bache was elected first president of Girard College in July, 1836. Councils finding school could not be established till buildings were erected for the purpose repealed the ordinance which authorized his election. Hon. Joel Jones was elected president by the board of directors in December, 1847, and organized the schools in the college in January, 1848, but resigned June 1, 1849. In November, 1849, William H. Allen, LL. D., then professor of mental philosophy and English literature in Dickinson College, Pennsylvania, was elected president. He was installed Jan. 1, 1850, and remained at the head of the college till 1863, when he was succeeded by Richard Somers Smith, who was inaugurated president June 24, 1863. President Smith was succeeded by President Allen in September, 1867, who occupied the chair till his death occurred Aug. 29, 1882. Adam H. Fetterolf, Ph. D., who had been elected vice-president November, 1880, was elected president Dec. 27, 1882, and Henry D. Gregory, Ph. D., was elected vice-president Jan. 24, 1883. (E. C. H.)

GIRARDIN, Émile de (1806–1881), a French journalist, was born at Paris, June 22, 1806. He was the natural son of Count Alexandre de Girardin, and in his youth was known as Émile Delamothe. But in 1827 he claimed his father's name, and ten years later his father acknowledged his right. Educated at the College of Paris, he was employed at the king's court, and afterwards in a broker's office. He began his literary career with a romance, *Émile* (1827), founded on the circumstances of his birth and boyhood. He was afterwards made inspector of the fine arts, and employed his leisure as a journalist. In 1831 he started the monthly *Journal des connaissances utiles*, at four francs a year, which soon attained a circulation of 120,000 copies. Around this paper crystallized various schemes for social improvement, including a model farm, savings banks, and a long list of cheap publications. These professed to be issued by a national society for intellectual emancipation, and had a powerful effect in promoting public instruction. In 1836 Girardin founded the *Presse*, a daily paper, of conservative principles. Its low price brought on Girardin the ill-will of other journalists. His character and every incident of his public and private life were assailed. The fierce controversies of this time led to a duel with Armand Carrel, editor of the *National*, in which the latter was killed. Girardin, who had previously fought three duels, thenceforth refused all challenges. He steadily supported Louis Philippe, but on the establishment of the republic in 1848 he speedily adapted himself to the new order of things and was the first to propose Louis Napoleon for President. But the course of the latter disappointed Girardin, who had now become radical and socialistic. After the *coup d'état* of Dec. 2, 1851, the emperor ordered Girardin out of France, but soon permitted him to return. In 1856 Girardin sold his share of the *Presse* for 800,000 francs, but its prosperity declined until he was recalled to the chief editorship, Dec. 1, 1862. He left it again in June, 1866, to found *La Liberté*. He pursued an independent political course, and gathered around him young and enterprising writers. For his fierce attacks on the administration he was fined and the public sale of the paper was prohibited, yet in the last year of the empire he supported the declaration of war against Prussia. When the Germans came to Paris *La Presse* was removed to the country. During the communist insurrection Girardin published a pamphlet advocating a federal government for France. In 1873 he purchased *Le Petit Journal*, and in 1874 became also chief editor of *La France*. In May, 1877, the ministry of the Duc de Broglie gave him new opportunities to display his ability as a polemical journalist. With his pen he was the champion of the people against the reactionary administration as Gambetta was with his voice. Though recognizing journalism as his proper field, Girardin was at times a member of the Chamber of Deputies. He died at Paris, April 27, 1881. In June, 1831, he had married Delphine Gay (1804–1855), whose writings, in prose and verse, helped to make his name famous. (See Girardin, Delphine Gay, in Encyclopædia Britannica.) In October, 1856, he married Guillemette Josephine, Countess Tieffenbach, widow of Prince Frederick of Nassau, but was divorced from her in April, 1872. Girardin from 1834 to 1879 poured forth a stream of pamphlets on political and social questions. Many of his contributions to the *Presse* were collected in twelve volumes, under the title *Questions de mon temps* (1858), and to these he added in later years under various names.

See Vol. X. p. 558 Am. ed. (p. 626 Edin. ed.)

GLACIER. In many mountain districts, notably in the Alps, the accumulation of snow, which gathers on the mountain tops during the winter, and which the heat of summer fails to melt, gives rise to certain interesting phenomena, known as glacial. The snow, increasing in depth, and compacted by pressure, is slowly pushed down to lower levels, gradually changing into ice as it moves onward. It continues to descend, flowing through the mountain valleys like a river of ice, until its further descent is checked by the action of the solar heat, which melts it below to an extent equivalent to its additions above. Such an ice stream is known as a glacier. The causes and peculiarities of its motion present some interesting and puzzling problems, which for many years past have been diligently studied by ardent investigators, the easily accessible glaciers of the Alps presenting a very favorable field for such study. Many theories as to the cause of glacial motion have been advanced, none of which have been accepted as fully satisfactory. The effects of pressure, of gravity, of viscous yielding, of regelation, etc., have been offered in explanation, but none of the causes adduced seems singly sufficient for the observed effects. The probability is that all these influences combine, and that the final result is an aggregate product of several causes.

A glacier, as seen from above, presents the aspect of a river of ice, filling the mountain valley through which it descends, and conforming to its curves. Its surface becomes more or less cracked and fissured, some of these fissures extending through its whole thickness, and affording a channel for the downflow of water produced by surface melting. A row of stones marks each side of the ice stream, being the droppings and rendings from the sides of its rocky channel. Other rows of stones are seen towards the centre, in cases where two or more glaciers have combined into a single final one, these stone lines marking the limits of the several components. Other stones, sometimes of considerable size, are borne along by the bottom of the ice flow, scratching, polishing, and channelling the rocky bed as they move irresistibly onward, while the abraded materials are ground into pebbles, sand, and impalpable mud. This material is borne onward both by the glacier itself and by the stream of water which flows beneath the outcome of the surface meltings.

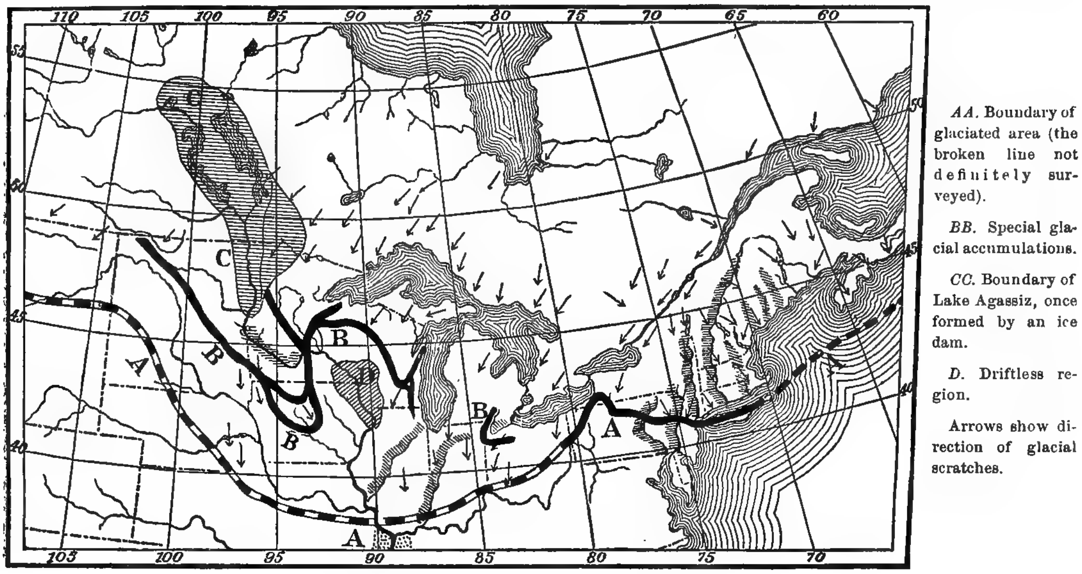
The final result of all this is visible at the front of the glacier. What there appears is a rude heap of stones, the accumulation of years, surmounted by rent and dirty ice, steep of face, and deeply furrowed by gullies. If large, a stream of water will issue from beneath it. If the moraine, or stone heap, is cut through, the ice front presents a cavernous, arched opening, from which the steam flows. The water issuing from this cavern is full of sediment, the sands and mud brought downward from above. The lake or river into which this glacial stream flows is often discolored for miles by the accumulation of sediment.

In the temperate regions of Europe and America the glacial stream never reaches the sea, the solar heat being always sufficient to check it at a higher level. In Greenland the contrary is the case. In South Greenland the line of the glacial foot is several hundred feet above sea-level, but farther north it extends to the shore, and pushes out over the sea bottom. In this region immense glaciers exist, no longer conforming to the lines of valleys, but deep enough to cover all the inequalities of the surface. The great Humboldt glacier is said to have an ocean front of 50 miles. As the ice is pushed out into deeper water it is subjected to a lifting action, which breaks off huge masses known as icebergs. The Greenland glaciers advance very slowly, yet their progress is from 100 to 300 feet annually, and the berg ice thus broken off and set afloat may amount to 100 square miles each year.

Glaciers occur abundantly on all the continents except Africa and Australia. In the Alps there are said to be over 1000, of which about 100 are of the "first order" of De Saussure. In Asia the Himalayas bear the largest glaciers known outside the polar regions. Some are said to be between 30 and 40 miles in length. Few exist in Northern Asia, this being a region of moderate precipitation. In America they are found throughout great part of the mountain barrier of the west. In the extreme south of South America the glacier ice extends from the Andes into the fiords of the west coast, and is broken off and floats away as bergs. Northward the Andean glaciers decrease in size, and they vanish near the equator. In Mexico some small ones exist. In the Western United States the most southerly glaciers are those of Mt. Shasta in California, of which the largest is 4½ miles long. Larger ones occur on the Cascade range of Oregon and Washington, one upon Mt. Rainer being described as 4 or 5 miles wide and 10 miles long. In British America the glacial ice reaches the sea-level at Mt. St. Elias. In Alaska glaciers exist of great length and width, pushing out into the ocean bays. Elsewhere in North America the conditions of snowfall and elevation are not favorable to their formation.

The Glacial Period.—The glaciers which now exist are but the remnants of enormous ones which apparently existed in a late geological era, and which covered Northern Europe and America with vast sheets of ice. It is true that no absolutely positive proofs of such a condition exist, but the evidences in its favor are so numerous, and so inexplicable under any other theory, that no doubt of the former existence of such continental glaciers is now entertained. That of Europe extended south from Scandinavia over Northern Germany and a great part of the British Islands, while the Alps sent out their ice rivers many miles in advance of their present limits. In America the ice-sheet was of enormous proportions. Whether it descended from Greenland, or from the central region of British America, is still a debated question, but its lower limit is somewhat clearly marked out by the line of the moraine which it left behind it. This lower limit extends along the Atlantic coast to Long Island and Perth-Amboy, N. J. Throughout this region the great glacier probably extended into the ocean, and gave rise to bergs. The limiting line extends through New Jersey in a north-westerly direction, and enters Pennsylvania south of the Water Gap. It passes through this State in a somewhat devious course, and leaves it at a point north of Pittsburg. Thence it passes through Ohio, touching the river east of Cincinnati, and extending, for a few miles, into Kentucky. From this point it passes onward through Middle Indiana and Illinois, and the States farther west as far as Dakota. Beyond this point the moraine disappears, and it is probable that in the drier region to the west the glacier-forming conditions were wanting. The movement of this great glacier was not due south. Its direction was south-east over the Atlantic slope. Farther west it was southward and south-westward. Its lines of motion converge northward toward a region north-west of Montreal, which formed its more immediate centre of motion. This immense Atlantic glacier was paralleled by two narrower western ones, which respectively descended along the Pacific coast region, and along the higher ridges of the Rocky Mountains, the latter probably extending very far south.

The thickness of the Atlantic glacier was in due proportion to its extent. It seems to have pushed southward with little conformity to the valley lines, as if every outline of elevation was buried beneath its enormous depth. Indications of its presence are found 5500 feet high on the White Mountains, nearly 3000 feet high in Southern Massachusetts and the Catskill region, and 1000 feet high in Southern Connecticut. These indicate the lowest limit of its depth, which was probably considerably greater, and can scarcely have been less than 6000 or 6500 feet in Upper New England.



AA. Boundary of glaciated area (the broken line not definitely surveyed).

BB. Special glacial accumulations.

CC. Boundary of Lake Agassiz, once formed by an ice dam.

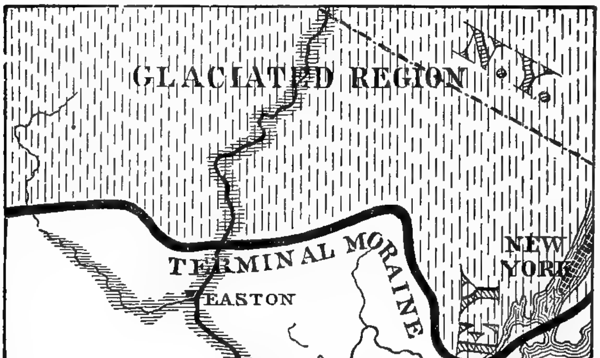
D. Driftless region.

Arrows show direction of glacial scratches.

The Glaciated Area of North America.

From Surveys for *Studies in Science and Religion.*

The arguments for the former existence of this extraordinary state of affairs are numerous. Throughout the region mentioned the conditions produced by modern glaciers are found to exist on an enormous scale. The whole surface of North America, from the Arctic shores to the latitude of from 40 to 38° south, has been scraped, furrowed, and scoured by ice action. The "barren grounds" bordering on the Polar Seas, as described by Dr. Richardson and others, present "round-backed ridges," "very obtuse conical hillocks," "land-locked sheets of water," furrows and scratchings on the harder rocks, all well-known glacial indications. In Labrador and throughout Canada similar conditions are common. The profusion of lakes spread over the whole drainage area of the St. Lawrence, Hudson's Bay, and the Arctic Ocean, as well as in the Northern United States, leads to the same conclusion. They must owe their existence in great part to ice excavation, for they either rest in rock-bound hollows, or are dammed back by irregular ridges of glacial deposits. The polishing, scratching, and furrowing of the rocks, which exist throughout the region named, wherever the rocks are hard enough to resist weathering, is a condition which can be explained on no other hypothesis than the glacial. These scratchings are often found in closely crowded parallel lines, though grooves of a good yard in depth and several feet wide are sometimes found. The conditions are such as would naturally be produced by an ice plane of enormous weight, a mile or more in thickness, with numerous sharp stones frozen into its bottom and pushed onward with irresistible force over the rocks and earth beneath. Wherever the rocks were soft, or were jointed and fissile, they were broken into fragments and swept forward, thus forming or deepening valleys and lake bottoms. The lines of scratches observed pursue a nearly regular course over high and low lands alike, without regard to valley slopes, except in the case of the great valleys of the country, thus proving that no mountain range was sufficiently high to seriously distort the course of the ice-flow. It may here be said that glacial scratches are also found on the boulders by which the scratching is supposed to have been performed. The rocks below reacted upon the rocks above.



Glaciated Region of Pennsylvania and New Jersey.

An equally significant indication of glacial action is found in certain abundant deposits throughout this region. The lowest of these deposits is the "unstratified boulder clay." This "drift" or "till" is a heterogeneous mixture of gravel, sand, and clay, with subangular stones of all sizes mixed irregularly through it. It is strewed alike over hill and dale to a depth of 30 to 300 feet, its greatest depth being in the valleys. The lowest part is often a stiff clay, enclosing stones, and resting generally on the polished and striated rocks, though in some places it overlies beds of sand and gravel. Over wide regions of the "Barren Grounds" and Labrador this deposit seems entirely absent, or occasionally occupies hollows in small patches. It is plentiful in most of the glaciated Northern States. This result is in accordance with the theory, since, if this material arose from the grinding of the rocks to the north, it would necessarily be deposited in greatest quantities in the more southerly regions. South of the terminal limit of the glacier drift is also found, extending farthest south in the river valleys, and in the Mississippi Valley reaching almost to the Gulf. But this drift, consisting of sand, clay, pebbles, and cobble-stones, is stratified, and is ascribed to water action subsequent to the glacial epoch.

The withdrawal of the ice-sheet was marked by the stranding of the huge blocks of stone, which had been frozen into or borne on the surface of the ice, and by the accumulation of moraine rubbish and diluvial sand and gravel. Numerous mounds of sand and gravel thus formed occur throughout the Northern States, composing hills and ridges of every shape. The ridges are sometimes straight for considerable distances, but are commonly tortuous, while the hills are rounded and even conical, closely resembling what are known as *Kames* in Scotland. Immense multitudes of large erratic boulders cumber the surface in many parts of the Northern States, Canada, and Labrador, and are scattered over the tops and slopes of the mounds and ridges. Similar conditions exist as far north as the Barren Grounds of the Arctic slope. Some of these stones are of immense size, and they may be found from the dimensions of a pebble to blocks of over 40 feet long and 20 feet wide and high. They have been transported usually from 16 to 40 miles, though in some cases more than 200 miles, as learned from research into their localities of origin. The material referred to has been transported not only over the solid surface, but even over the great lakes and Long Island Sound, the land to the south of these being covered with stones from the north.

With the gradual cessation of the intense cold to which this remarkable glacial condition was due, the glacier began a slow retreat, dropping its accumulated foreign materials as it did so. But the retreat seems to have been by no means regular, and to have been attended by occasional protrusions of a more local character. As a consequence new sets of glacial striæ were made in favorable localities, differing in direction from the primary set. Traces of great local glaciers exist in various localities, as in the valleys of the White Mountains, and those of the Rockies and the Sierra Nevada. Terminal moraines mark the site of these local glaciers, which gradually disappeared as the cold decreased. One of these in the Sierra Nevada filled the Yosemite Valley, and passed down Merced Cañon. Others extended into the basin of Lake Tahoe.

The great glacier here indicated, improbable as its existence may seem, has a partial parallel in the ice-sheet which now covers Greenland. This great island, 1200 miles long and 400 to 500 wide, is covered to a depth of 3000 feet with ice, forming a not inapt parallel to the ancient glacier described. The existence of such a glacier, however, requires conditions of refrigeration of which we have no experience, and whose cause is not of easy discovery. Many theories as to the origin of such an era of intense cold have been promulgated, such as the translation of the solar system into colder regions of space, the change in position of the earth's axis, the redistribution of land

and sea, the elevation and depression of the land, the change of land relations in the tropical and frigid zones, etc. None of these are accepted as satisfactory, and the solution now most generally adopted is an astronomical one offered by Mr. Croll. He ascribes the phenomenon to the variation in eccentricity of the earth's orbit, and the cyclical change through which the earth is now nearest to, now farthest from, the sun in winter. This cycle is 21,000 years in length. The most important of these causes is that which produces variation in the eccentricity of the orbit. Within the last three million years three such eras of high ellipticity have occurred, the latest of which began about 240,000 and ended about 80,000 years ago. This, in his theory, was the period of the last great glacial epoch, similar epochs having possibly preceded it. The arguments by which this theory is sustained are too many and lengthy to be here presented, and we can only say that there is a general disposition among geologists to accept it.

The glacial phenomena here considered have produced great changes in the superficial conditions of North America. And these changes are by no means confined to the region actually covered by the glacier. The melting of such a vast body of ice necessarily gave rise to extensive floods, breaking through the terminal moraine in many places, and transporting the glacial mud and sand far to the south. These floods also had much to do with the formation of the *Kames*, or hills and ridges of sand and gravel described. As a general result the surface of the country has been extensively modified, numerous small lakes formed; vast patches of boulders, sand, and gravel deposited; the surface to the north swept of materials to be transported farther south, and great diversities of soil and conditions of fertility from those formerly existing established. Similar results are apparent in Northern Europe, and in other regions where great ancient glaciers existed; but the consideration of the American continental glacier will serve as a fair exemplification of the general results of this powerful geological agency. (C. M.)

GLADSTONE, William Ewart, the greatest English statesman of the nineteenth century, was born Dec. 29, 1809, in Seaforth House in a suburb of Liverpool. He is of purely Scottish descent. His father, John Gladstone, had begun business in Glasgow, but removed to Liverpool and acquired wealth in the West India trade. He then entered Parliament as a representative of Liverpool, and in 1846 was made a baronet. William, the fourth son, was educated at Eton, and afterwards at Christ Church College, Oxford. At both he gave abundant proof of extraordinary intellectual and oratorical powers and established a high reputation for purity of character. On graduating in 1831 he took the first honors in both classics and mathematics, and became a fellow of All Souls'. He then spent six months in Italy, and in December, 1832, was elected to Parliament from Newark, a borough in the patronage of the Duke of Newcastle. The election address which he issued at this time (Oct. 9, 1832) is a noteworthy document. In it he declares his conviction "that we must watch and resist that uninquiring and undiscriminating desire for change among us, which threatens to produce along with its partial good a melancholy preponderance of evil." Being a devoted follower of Sir Robert Peel, in 1834 he was made a junior lord of the treasury, and in the next year under secretary for colonial affairs, only a few weeks before that ministry was driven from power. In opposition Gladstone displayed the same brilliancy which had been shown at his entrance to Parliament. But he was also inclined to literature, and became a frequent contributor to the *Quarterly Review*, chiefly on literary and ecclesiastical topics. His views at this time are set forth in his work on *The State in Relation to the Church* (1839), which gave Macaulay the opportunity for his famous critique in the *Edinburgh Review*, whose opening sentence runs: "The author of this work is a young man of unblemished character and of distinguished parliamentary talents, the rising hope of the stern and unbending Tories." In 1876 Mr. Gladstone contributed to the *Quarterly Review* an article on Lord Macaulay, a magnanimous return for this criticism of his youthful performance.

In 1841 the Tories came into power, and "handsome Gladstone," as he was called, was appointed vice-president of the board of trade and master of the mint and sworn of the privy council. The revision of the British tariff in 1842 is ascribed to him, and shows his tendency even then towards free trade, which, indeed, he has said he learned first from Canning, his father's friend. In May, 1843, he became president of the board of trade, but two years later he retired from office, when the government took up the measure for the increase of the grant to Maynooth College. But when a new cabinet was formed Mr. Gladstone accepted the position of secretary of the colonies. When the crisis came, and Sir Robert Peel, yielding to the pressure against which he had long struggled, fully accepted the policy of free trade, Gladstone, who was still more profoundly a convert to the new views, felt compelled to resign his seat since his patron, the Duke of Newcastle, remained steadfast in the traditions of the Tory party. This proof of Gladstone's extreme conscientiousness was a matter of amazement to the politicians of the time. Before he re-entered Parliament the battle had been fought and won for free trade—won so decisively that free trade has since been a cardinal principle of every administration.

The interval from the beginning of 1846 to the summer of 1847 is the only break in Mr. Gladstone's parliamentary career. The elections of the latter year gave the University of Oxford an opportunity to choose as her representative the son who had already done her so much honor. He was still a typical High Churchman, yet there were not wanting indications that his mind was moving with the current of the age, and was learning to set a higher value on the principles of human liberty. Although a few years before he had opposed the removal of the civil disabilities of the Jews, he now spoke in favor of admitting them to Parliament. Again, in 1851, he was one of the small band that protested against the futile attempt to prevent the formal institution of a Roman Catholic hierarchy in Great Britain. Personally he is still a devout High Churchman; but he has long recognized the political wisdom, justice, and necessity of according to all citizens the largest measure of religious liberty.

It was Lord Palmerston's effort, by a brilliant foreign policy, to divert attention from troublesome domestic questions. This led him in 1850 to defend the rash British admiral who had blockaded the Piræus and bullied the insecure government of Greece in behalf of a scarcely naturalized British subject. In these Don Pacifico debates he triumphantly declared that he had vindicated for Englishmen abroad the privilege implied in the old Roman boast, *Civis Romanus sum.* Gladstone in reply sought boldly to wrest this very weapon from the veteran's hand and to turn it against him by denouncing in the name of humanity the claim for Englishmen of the exceptional privileges of a conquering race. Palmerston, indeed, won a momentary victory, but the lasting honor of the debate rests with Gladstone. Thenceforth he has been the champion of the application of the fundamental principles of Christianity to all national questions.

Later in the same year he again visited Italy, and while sojourning at Naples became aware of the oppressive cruelty of the government of Francis II. On his return to England he exposed the merciless tyranny of the Bourbon rule. His pamphlet on this subject was widely circulated on the continent and excited an active controversy. Lord Palmerston in Parliament complimented Gladstone on his generous work and sent copies of the pamphlet to all the courts of Europe. Garibaldi declared it to have been "the first trumpet call of Italian liberty."

The death of Sir Robert Peel in 1850 had dissolved the bond which united those members of the Conservative party who had fully gone with him in accepting free trade. Gladstone still remained unattached to either party when, in 1852, Disraeli as chancellor of the exchequer presented his first budget. Disraeli had first established his position as a parliamentary orator by his fierce invectives on Sir Robert Peel, his former leader. Gladstone, faithful to that statesman's memory, now took keen delight in exposing his rival's financial crudities. The memorable debate of that occasion was the opening of the marvellous duel of twenty-five years, which ended only when Disraeli passed into the house of peers. In the first onset Disraeli was defeated and the ministry resigned. Lord Aberdeen, in forming the new cabinet known as the "Coalition Ministry," made Gladstone chancellor of the exchequer, and on April 18, 1853, the latter delivered his first budget speech. Its luminous exposition of finance has been matched only by his subsequent efforts in the same field. Finding himself with a liberal surplus he largely reduced or even totally abolished the duties on hundreds of articles of daily use, and though he somewhat increased the income tax he depended rather on the "elasticity of revenue" to make good the deficiencies immediately accruing. His predictions were accepted with confidence and were abundantly justified by the result effected. Henceforth Gladstone's supremacy as a financier was undisputed, and his budget speeches were the great events of parliamentary sessions. The commercial prosperity of England advanced, to use his own phrase, "by leaps and bounds."

The Crimean war, into which the Aberdeen ministry reluctantly entered, absorbed all the surplus which had accumulated in the few years previous, and likewise the revenue from extra taxation, on which Mr. Gladstone had insisted when war was declared. He has been charged with inconsistency for actively supporting this war yet opposing Disraeli's moral support of Turkey in 1877. It is a sufficient reply to state that in the debate on the terms of the treaty of peace in 1856 he declared that he should condemn a peace which bound Great Britain to maintain the law and institutions of Turkey as a Mohammedan state.

Gladstone was fully committed to the principles of the Liberal party when in 1859 Lord Palmerston made him again chancellor of the exchequer. It was at this time that Mr. Cobden negotiated the famous Anglo-French commercial treaty, and the congenial task of its support in the House of Commons devolved on Mr. Gladstone.

At the outbreak of the civil war in America Mr. Gladstone shared the feeling common to many English statesmen, that the permanent separation of the Northern and Southern States was inevitable, and has been charged with desiring that result. This charge he answered in a letter addressed to Gen. R. E. Schenck, the U. S. minister to Great Britain, which was published in *Harper's Magazine* for November, 1876. On many occasions Mr. Gladstone has expressed a friendly interest in the welfare of the United States. But he has not, as some of the advanced Liberals have done, professed to regard the institutions of the American republic as models for the renovation of those of his own country. He sees without dismay the approaching enlargements of the British constitution, and even hails them with desire. But he seeks these changes only as the voice of the people demands them.

Parliamentary reform, inaugurated in 1832, again came to the front in 1866. It was perhaps unfortunate that the question was presented to a newly elected Parliament. Mr. Gladstone presented a moderate bill, yet he was charged by Mr. Disraeli with an attempt at "Americanizing our institutions." A few Liberals who took the opportunity to secede were wittily described by Mr. Bright as having retired to the Cave of Adullam. Yet their secession was enough to defeat the government, and the Liberals retired from power. The cause of the people could not be stayed, however, and by the time the next Parliament convened Mr. Disraeli had educated his party up to "taking a leap in the dark," and eventually passing a reform bill whose democratic tendency surpassed any proposed by the liberals. Thus Disraeli "dished the Whigs."

The Conservative ministry formed in 1866 had the support of only a minority, and the genius of Disraeli was taxed to the utmost in maintaining it in equilibrium. The calling up of a truly national question was all that was needed to show its instability. Such a question lay easily at hand. The condition of Ireland was a chronic reproach and menace to England's prosperity. Among its anomalies that of the Established Church was the most flagrant. Mr. Gladstone had learned the practical inapplicability of his youthful arguments in its behalf, and in March, 1868, he struck the first blow for disestablishment. Justice to Ireland was his theme, as it was in many a subsequent struggle, until in 1886 he took the vast responsibility of proposing an Irish Parliament. Though Mr. Gladstone's resolutions in favor of disestablishment obtained large majorities, yet Disraeli tenaciously clung to office and finally dissolved Parliament in November. The most remarkable feature of the election which ensued was the defeat of Mr. Gladstone for South Lancashire. He had ceased to represent Oxford in 1865. But he was now returned for Greenwich, and the new Parliament showed a Liberal majority of 120. Disraeli forthwith resigned and Mr. Gladstone was called to form a new ministry. On March 1, 1869, he introduced his measure for the disestablishment of the Irish Church, unfolding in a speech which won the highest praise even from Disraeli the details of his comprehensive scheme. Earnestly, eloquently, and without hesitation he proceeded to the consummation of his arduous task, while the members were spellbound by his lucid statement and oratorical power. In spite of the utmost efforts of the Opposition, the majority for the government was 118. The passage of the bill, which was carried through the house in less than five months mainly by the unflinching energy of Mr. Gladstone, has been pronounced the most remarkable legislative achievement of modern times.

In this golden age of liberalism other measures of great importance were passed, the Elementary Education Act, the abolition of purchase in the army, the removal of the University tests, and the Trades Union bill. Reform seemed to reach in every direction, to strike at every abuse, social or political. Among the Liberals some differences came to light on foreign questions, on the Irish question, on the educational question. Gradually the Liberal majority fell off, until on the Irish University bill, by which Gladstone hoped to do a further act of justice, it was turned to a minority of three. Mr. Gladstone determined to appeal to the country, and Parliament was dissolved in January, 1874. The answer was decisive, and Disraeli came into power with a majority as strong as that of Gladstone six years before. The pendulum had swung back.

After forty-two years of public life, Gladstone resigned the leadership of his party. Cogent reasons were presented for this action; the Liberals admitted their force, while they deprecated the result. But it was impossible for him, as he had intended, to appear occasionally in Parliament without showing himself the true leader of his party. This interval of self-imposed semi-retirement was filled with new work, the most noted of which was his attack on the Vatican decrees as destructive to civil allegiance. The controversy which ensued involved the ablest representatives of the Roman Catholic communion.

Important as was this controversy its practical effects were less than those of his writings and speeches on the Bulgarian atrocities, which, indeed, involved the whole Eastern question. Disraeli had determined to give the Turkish government moral support against Russia, and during the war of 1877 he fully carried out this plan. A vigorous foreign policy was now the sheet anchor of the Tories as it had been that of the Whigs in Lord Palmerston's time. In Europe, in Asia, and Africa there were wars and rumors of wars in behalf of British interests. Mr. Gladstone entered upon a crusade in behalf of the rights of other nations, which was a concrete fulfilment of what had been an abstract promise in his arraignment of Lord Palmerston's policy. In 1879 Mr. Gladstone accepted the invitation of the Liberal electors of Mid-Lothian to stand as their candidate, though the district was a stronghold of Conservatism and his opponent the son of the Duke of Buccleugh. His aggressive campaign astonished the United Kingdom. Day after day he delivered speeches whose intellectual force was equalled only by the physical endurance of the speaker. A flood of liberalism swept over Scotland, and though Lord Beaconsfield still believed that his hold on England was unshaken, the result of the elections of 1880 proved that his rival's "exuberant verbosity," as he was pleased to term that resistless eloquence, had reached the popular heart and conscience. The Liberal majority in the new Parliament was 114, and the great commoner, to whom the political revolution was due, was justly called to be prime minister.

Unfortunately the outgoing ministry left him a burdensome legacy of war and foreign entanglements. In Afghanistan, in Egypt, in South Africa apparently inextricable confusion prevailed. In settling these troubles on an equitable basis blood was shed, money was sunk, warm friends were alienated, but the veteran "bated not a jot of heart or hope, but still bore up and steered right onward." The wild war-dance of frenzied nations, roused by the British drum, gradually subsided. From England now went forth messages of peace, of hope and sympathy to the down-trodden. But nearer home, in the sister isle of Ireland, there remained the most vexing trouble of all. There a people, wholly dependent upon agriculture, lay at the mercy of their landlords, who were to all intents foreigners. The Irish formed a Land League to obtain three F's—fair rent, fixity of tenure, and free sale. But bad harvests and the oppression of the landlords led to agrarian outrages. Gladstone at once brought forward measures for partial relief, while for repression of disorder a coercion bill was enacted. In 1881 the Irish Home-rulers under Parnell's leadership so obstructed parliamentary business as to compel the adoption of new rules in the House. Gladstone's land law now granted substantially the three F's, but the Home-rulers still demanded the legislative independence of Ireland. They obstructed the operation of the land law, and then for a time Parnell was imprisoned. A "No-Rent" manifesto was then issued, and when Parnell was liberated it was evident that Gladstone had come to an understanding with him. The Home-rulers showed by unmistakable signs that they represented the wishes of the Irish people.

Gladstone had, in 1883, given up the functions of the chancellor of the exchequer, but the government still in every crisis was obliged to depend on his rhetorical genius. But in 1885 the Home-rulers, whose numbers had steadily increased, suddenly combined with the Conservatives, and the Liberal ministry resigned. Such a coalition could not last, and in the next session of Parliament the Conservatives were easily defeated. In February, 1886, Mr. Gladstone became prime minister for the third time, and at once indicated his purpose to accept the course of events as decisive of the Irish question. His former policy of mingled concession and repression was to be laid aside, and the demand of the Irish people for the management of their own affairs was to be granted. The scheme which he proposed for the autonomy of Ireland in insular affairs was unfolded in a speech of marvellous power on April 8, 1886. What will be the decision of Parliament on this momentous question remains to be seen. The very proposal of such a plan is an event of extraordinary magnitude, and may fitly close our brief and imperfect outline of Mr. Gladstone's political career.

At every stage of this career and in every department of statesmanship Mr. Gladstone has given evidence of the highest genius. His return to the leadership of his party after his resolve to retire was a necessity which was recognized by all. Without him the party was unable to satisfy its adherents and to formulate its own principles in practical shape. With him again at its head it was triumphant at the polls and aggressive in Parliament. However great have been the labors of others in an age of unprecedented political activity, yet for more than a generation every important measure in British legislation has been framed on the lines which he had marked out. It is charged that he has not been equally fortunate in winning personal attachment, and has therefore sometimes failed as a mere party leader. Thoroughly in earnest in everything he undertakes, he has disdained to win the support of others on different ground than rational argument. But in every great historical crisis this sincerity and simplicity of purpose have given him the greatest advantage and have increased a hundredfold the force of his words. His noble appeals to the national conscience have served to raise British legislation to a higher plane of Christian civilization.

What rank shall be assigned to Gladstone as an orator? The almost universal verdict of critics, indorsed by the unanimous popular judgment, places him foremost in nearly every department of eloquence. In some kinds of oratory, that of invective for instance, which his great Tory rival cultivated, Gladstone has rarely indulged, though his refraining may be due to moral rather than to intellectual reasons. Mr. John Bright is the only member of Parliament whose speeches have at times reached such a height of eloquence as to justify a claim to equal rank as an orator. Some critics have compared Bright to Demosthenes and assigned to Gladstone the place of Cicero. While their respective manner of speech furnishes some foundation for such a parallel, it cannot be seriously maintained. The superiority of Gladstone's genius is shown not only in his wider sweep of wing but in his attaining a loftier height. His parliamentary speeches, while preserving the classic traditions of the House of Commons, have been practically effective in winning votes as well as drawing crowds. Before popular assemblages he has always appeared to great advantage. The triumphs of his Mid-Lothian campaign have been unparalleled in English history.

Among the statesmen who have won fame in literature Mr. Gladstone holds a foremost place. His larger literary works have been devoted to Homer, whose poems have furnished him lifelong enjoyment. His *Studies on Homer and the Homeric Age* (3 vols., 1858) show him stanchly conservative in scholarship, yet an able and profound critic. His *Juventus Mundi* (1869) is a popular presentation of the conclusions reached in the former work, and his *Homeric Synchronism* (1876) is an attempt to fix the time and place of Homer and of the events which he recites. Interesting as these treatises are, Mr. Gladstone's briefer articles in various periodicals and on various themes are still more attractive. Many of the most valuable have been collected in his *Gleanings of Past Years* (8 vols., 1879), and his later occasional writings show no diminution of merit or power.

Within our narrow limits it has been impossible to give an adequate sketch of the life and works of this scholar, orator, and statesman. His words and deeds will ever form an imperishable monument of British greatness. (J. P. L.)

See Vol. X. p. 576 Am. ed. (p. 647 Edin. ed.).

GLASS, a compound of silica with soda or potash, with the addition of an alkaline earth, such as lime or oxide of lead. This compound forms a brittle, transparent substance, unaffected by water or the ordinary solvents, and of the highest value in the arts, since it is employed in an immense variety of industrial and artistic purposes. Its superiority over other transparents consists in its fusibility at a high temperature, and its softness at a red heat, which permit its ready moulding into any desired shape. Its fusibility also enables it to accept many shades of color, which can be added without detriment to its transparency; while, though very hard, it can be readily cut with the diamond, through which its susceptibility to artistic treatment is greatly enhanced.

Glass, as manufactured for various purposes, varies so greatly in composition that it is impossible to give any exact formula of its constituents. Chemically it is a silicate of lime and soda or potash, though the proportions of these elements are so varied that no definite chemical compound can be made out. The silica, for instance, may vary from 50 to 75 per cent., the lime from 5 to 20. Plate-glass contains both soda and potash, while other varieties have but one of these constituents. In lead flint-glass the lime is replaced by a large proportion of oxide of lead, while the common green bottle-glass contains, in addition to these substances, a proportion of alumina and oxide of iron. These latter are impurities in the sand, the greenish hue being due to the iron. The transparency of glass would be gained by the use of silica and soda or potash alone, but the lime or lead are necessary, as making it more resistant to the action of solvents.

It is our purpose here to confine ourselves mainly to the subject of glass as an American industry, and not to enter upon the extensive subject of its history and the details of its various processes of manufacture. In regard to the various ingredients which enter into the composition of glass America stands on a level with other countries, and has a decided advantage in one respect, that of the superior quality of its sand, the source of the silica of glass. This, the basic element of glass, is obtained in some countries from quartz or flint, but only where good sand cannot be procured, the use of the latter being almost universal. The purity and fine quality of American sand is everywhere conceded, and gives to our finer grades of glass a transparency that has excited admiration abroad. The glass made from Berkshire sand was much admired at the London exhibition of 1851, while at the Paris exhibition of 1867 some American flint-glass "surpassed in purity of color all other specimens of glass, whether British or foreign." England, in fact, possesses very little sand suitable for the better grades of glass, and French and German sand is imported for this purpose. Nowhere in Europe, however, is there any parallel to the almost inexhaustible deposits of pure sands in America, suitable for the finest glass. The most important localities now worked are those of Berkshire, Mass.; Juniata co., Pa.; Hancock co., W. Va.; Fox River, Ill.; and Crystal City, Mo.; but there exist immense beds of good sand elsewhere.

Soda of English manufacture enters into the composition of nearly all glass now made. It is extracted from sulphate and carbonate of soda, and is now becoming an article of manufacture in this country, being prepared from common salt. Much of the potash used is extracted from wood-ashes. America has served as an important source of this material, and great tracts of timber have been burnt, in the past history of the country, for the ashes alone. Canada and Russia are now the main source of this material, though potash is supplied to some extent from other sources than wood-ashes. Another important element in the manufacture of glass is pot-clay, which comprises certain very pure and refractory varieties of fire-clay, from which the melting-pots are made. At present the largest proportion of pot-clay is brought from Germany, but American clay is fast superseding it. There are large deposits of excellent pot-clay in many localities of the United States, that now used coming chiefly from Western Pennsylvania, New Jersey, and Missouri. It is purer and more refractory than the German clay, but not so dense. It is also less costly, and will probably in time completely supersede the German.

We can give but brief attention to the history of glass manufacture in the United States. It was tried as an industry in the early period of most of the original colonies, but very little information concerning these attempts is extant. The first known effort at glass-making in this country was in 1608, in the colony of Virginia. In that year eight Poles and Germans were brought to Virginia with intent to make "pitch, tar, glass, mills, and soap-ashes." Some glass was made, and sent aboard on the return of the vessel in 1608 or 1609. Probably this was bottle-glass only, the window-glass needed being imported. In 1621 a subscription was opened in London, for funds to erect a glass-house in Virginia to make glass-beads for the Indian trade. Some Italian workmen were sent over, but we know very little concerning their operations. Nothing further is known of glass-making in Virginia until 1787, in which year glass was exported to the amount of 10,000 lbs., and 500 hands employed. But the industry has been firmly established in that State only since 1815.

In Massachusetts a glass-house was erected in Salem, in 1639. Several slight mentions of similar enterprises occur between that date and 1787, in which year a large glass-house was erected in Boston, where work commenced in 1792. Since then glass-making has been more or less continuous, though the once foremost rank of this State has been lost through a deficiency of fuel. It yet yields, however, some of the best quality of glass made in America. In New York we hear of glass-making early in the history of the city. Of the recorded works there was one built before 1664, one in 1754 which proved unsuccessful, and one in 1786, since which the industry has been continuous. In New Jersey a German established a glass-house in Salem county between 1760 and 1765. This enterprise failed at the beginning of the Revolution, and the workmen removed in 1775 to the place now known as Glassboro. In this locality glass has been made since then without cessation, the Whitney works being the oldest continuous works in the country. In Pennsylvania a letter from Penn of the date of 1683 speaks of the existence of a glass-house in the colony. We know nothing further concerning it. The next mention is of a glass-house built by Baron Steigel in Lancaster, in 1762. In 1771 or 1772 there was one erected in Philadelphia. The Pittsburg glass industry began in 1797, coal being here probably first used as a fuel. There seems to have been little success in these efforts, and it was not until about 1830 that the industry became a flourishing one. In 1831 the Dyottsville factory, then the most extensive in the country, had 4 furnaces, melted about 8000 lbs. of batch daily, and produced about 1200 tons of glass yearly, mainly in bottles and vials. Yet the main seat of the industry in Pennsylvania has moved westward. In 1837 there were 13 factories in Pittsburg, yielding $700,000 in product; in 1857, 33 factories, with a yield of $2,631,990; and 45 factories in 1865, with a product valued at over $6,000,000.

We have not space to describe the progress of the industry in other States, and simply refer to one of its important branches, the manufacture of plate-glass. What was probably the first American attempt in this branch of the glass industry was made at Cheshire, Mass., in 1852–53. After six months' trial the works were removed to Brooklyn, where they ran through 1854 and 1855. Little merchantable glass was made, and the effort was abandoned in 1856. In the same year a second attempt was made at Lenox, Mass., only rough plate being made till 1865, when a polishing-machine invented for marble slabs proved admirably adapted to the polishing of glass. This machine is still in use in an improved shape. The western plate-glass manufacture began in New Albany, Ind., in 1869. The effort proved successful, and works have since been established at Louisville, Jeffersonville, Ind., and Crystal City, Mo., as also at Pittsburg, Pa. It is stated, however, that no plate-glass was made in the United States without loss before 1879.

Of special American contributions to the art of glass-making, far the most important has been the invention of the pressed-glass process, which has added enormously to the scope of the art. Pressed-glass had undoubtedly been made before the invention of the American lever-press, though what is now known as pressed-glass is of unquestionable American origin, despite an English claim to the invention some eight years later in date than the American. It is stated that a carpenter of the town of Sandwich, Mass., in 1827, desiring an article of glassware for some purpose, was informed at the glass-works that such an article could not be made He asked if a machine could not be made to press glass into any shape. The idea struck the proprietor, and he and the carpenter together fabricated a rude press, which proved successful. A glass tumbler, claimed to be the first article thus made, was shown at the Centennial Exhibition of 1876, where it was unluckily broken. From that time forward the manufacture of pressed-glass rapidly developed, until now the bulk of American glassware is made by this process. It has, in fact, markedly cheapened the manufacture of glass, revolutionized the whole system of flint-glass-making, and enabled manufacturers to offer for common use glassware of a grace of form and beauty of design which formerly only the most wealthy could enjoy.

The varieties of glass now manufactured in the United States may be epitomized as plate-glass, in the several conditions of rough, rolled, ribbed, and polished plate; window-glass; flint-glass, including table and other glassware, both blown and pressed, with a large class of bottles and vials; green-glass, a coarse greenish ware, chiefly used for common bottles, technically hollow-ware; and some other less important varieties, such as water-glass, iridescent-glass, etc.

The glass manufacture of the United States, according to the census of 1880, now includes 211 establishments with 348 furnaces, and employing 24,177 hands. The total capital is $19,844,699; wages, $9,144,100; value of material, $8,028,621; and value of product, $21,154,571. Of this latter sum the product of Pennsylvania is valued at $8,720,584; of New Jersey at $2,810,170; of New York at somewhat less than New Jersey, and of other States in rapidly diminishing proportion. Of the Pennsylvania glass 65 per cent. is made in Allegheny county, due largely to cheapness of fuel. Of the several varieties of American glass, the plate-glass product is given at 1,700,227 sq. ft., valued at $868,305; the window-glass at 1,864,734 boxes of 50 sq. ft. each, valued at $5,047,313. No estimate is given of the quantity of glassware and green-glass made, but the value of the former is stated at $9,568,520, and of the latter at $5,670,432. The industry has thus become one of great importance, and is steadily progressing in the value of its product and in the quality and artistic finish of its ware. (C. M.)

GLEIG, George Robert, a British clergyman and author, was born at Stirling, Scotland, April 20, 1796, being the son of Bishop George Gleig. He was educated at Glasgow and Balliot College, Oxford, received a military commission in 1813 and joined the Duke of Wellington's army in Spain. Serving afterwards in America, he was severely wounded at the capture of Washington in 1814. He then returned to Oxford, graduated and took orders. In 1822 he was made curate of Ash, and afterwards rector of Ivy Church. In 1844 he was appointed chaplain of Chelsea Hospital, and in 1846 chaplain-general of the forces. To carry out his scheme for the education of the soldiers, he was also made inspector-general of military schools. He resigned his office of chaplain-general in 1875. His early adventures are recounted in his amusing book, *The Subaltern* (1825). He also wrote *Campaigns at Washington and New Orleans*, a *Family History of England*, and a *Military History of Great Britain*. His *Life of Warren Hastings* was severely criticised by Lord Macaulay for its bulk and general heaviness. His *Life of the Duke of Wellington* (1859) was an improvement on the other. Among his lighter works are *Chelsea Pensioners*, *Country Curate*, and *The Hussar*. From his contributions to the *Edinburgh* and *Quarterly* Reviews two volumes of *Essays* were collected (1858).

GLIDDON, George Rogers (1809–1857), an American archæologist, was born in Devonshire, England, in 1809. At an early age he went to Egypt, where his father was a merchant and U. S. consul. He succeeded his father as consul at Cairo, and after spending altogether twenty-three years in Egypt came to the United States with a valuable collection of antiquities. He lectured in New York and other cities on Egypt. He afterwards became agent for the Honduras Inter-oceanic Railway Company, and died at Panama, Nov. 16, 1857. Besides other works he published *Ancient Egypt* (1850), *Types of Mankind* (1854), and *Indigenous Races of the Earth* (1857). Dr. J. C. Nott, of Mobile, assisted in the preparation of the last two, which by their flippant attacks upon the Bible evoked much hostile criticism.

GLOUCESTER, a city of Massachusetts, in Essex county, on the S. shore of the peninsula of Cape Ann, 30 miles N. N. E. of Boston, with which it is connected by a branch of the Eastern Railroad, and by steamboat lines. Its harbor is safe, capacious, and deep enough for all but the largest ships. Gloucester has a fine city-hall and other municipal buildings, a free public library, high and graded schools, several associations for the relief of the widows and orphans of seamen and fishermen, 3 national banks, a savings bank, 2 weekly newspapers, and 14 churches. It is the most important fishing-town in the United States, the cod and mackerel fisheries, with the associated industries, affording the chief business of the place. Its fishery fleet in 1884 was 289 vessels with crews of 3483 men. The total catch was 578,560 quintals of fish. There are within the city limits extensive quarries of granite, numerous establishments for utilizing the by-products of the fisheries, also anchor-works, and manufactures of railroad forgings. The city includes the outlying villages of East Gloucester, West Gloucester, Annisquam (on the north side of Cape Ann), Dogtown, Bay View (whence much granite is shipped), and Lanesville. Gloucester is a port of entry, and hundreds of schooners, mostly engaged in fishing and coasting, are here owned. Around Gloucester the country is high, rocky, and exposed to the ocean winds; it is, hence, a great summer resort, and within the city limits are many summer hotels. The property valuation is $11,203,457; the city debt, $148,000; the yearly expenses are $183,405. Gloucester was settled in 1633, was incorporated as a town and named Gloucester in 1642, was bombarded in 1775 by the British ship Falcon, and in 1814 by the frigate Tenedos. It was incorporated as a city in 1874. Population in 1860, 10,904; in 1870, 15,389; in 1880, 19,329.

GLOUCESTER CITY, a city of New Jersey, in Camden county, is on the east bank of the Delaware, opposite the southern end of Philadelphia, with which it has half-hourly communication by steamboat. It is connected with Camden, 4 miles north, by 2 railroads. It has a foundry and machine-shop and several cotton-factories, 6 churches, and 5 schools. It has water-works and is lighted with gas. Its property is valued at $1,770,000. It was settled about 1700, and incorporated as a city in 1868. Population, 5437.

GLOVERSVILLE, an incorporated village of New York, in Fulton county, 40 miles W. of Albany, is on a branch of the New York Central Railroad, being 7 miles from the main line. It has a town-hall, 4 hotels, 1 national bank, 3 weekly newspapers, and 5 churches. The industry of the town is entirely devoted to the dressing of leather and the manufacture of gloves. The streets are wide and lighted with gas. The property is valued at $3,000,000; the public debt is $92,500. The village was incorporated in 1873, and in 1880 had 7133 inhabitants.

GLUCOSE. Of recent manufactures in the United States none has sprung more rapidly into activity than that of "glucose," also known in its solid form as "starch sugar." Its production has now become an important American industry, though it is still regarded by many with a measure of distrust, as an unwholesome and impure article of diet. This prejudice, however, is ill-founded, as we shall seek to show further on. This sugar, though known as a constituent of grapes since 1792, was first made from starch by Kirchoff, a Russian chemist, in 1811. In 1819 Braconnet prepared it from wood fibre. It was prepared by boiling the starch or wood in dilute sulphuric acid. It was then believed to be identical with cane sugar, and came into use as an article of food during the English blockade of Continental ports in the Napoleonic wars. After this period its use declined, it being found that it differed from cane sugar, and was less sweet and soluble. Several attempts were made to introduce its manufacture into the United States, but with little success. Recently, syrups and molasses having become more scarce and dear through changes in the methods of sugar-making, the glucose industry has revived, and, aided by improved processes, its manufacture has assumed large proportions. The industry is generally associated with starch-making, the product being used as starch, or converted into glucose, in accordance with the demand of the market.

On Aug. 1, 1880, according to Prof. Wiley, there were 10 glucose-factories in the United States, consuming daily about 20,000 bushels of corn. The product in 1880, by the census report, was valued at $4,324,072, the capital invested being $3,916,750. Of the total product nearly one-half was credited to Pennsylvania. In the year 1885, by the estimate made by the American Glucose Company, of Buffalo, N. Y., there are 13 factories in operation, 5 of which are owned by this company. None of these are in Pennsylvania, they being all in the Western States, except one at Buffalo, and one at Glen Cove, L. I. The aggregate capacity of these works is about 50,000 bushels of corn per day, but the actual daily consumption is from 25,000 to 30,000 bushels, or from 7,500,000 to 10,500,000 bushels per annum. The estimated yield of glucose and starch sugar from this quantity of corn is from 225,000,000 to 315,000,000 pounds, worth from $5,125,000 to $7,875,000. The capital invested in this industry is about $7,500,000, and the annual wages paid nearly $1,000,000. It is claimed that the promotion of the glucose industry has been the main agent in reducing the price of cane sugar to consumers, and that it has thus been an important factor in giving the people cheap sugars.

Commercially the term "glucose" is confined to the thick syrup made from corn-starch, while the solid product from the same source is known as "grape" or "starch sugar." In its manufacture the corn is first soaked for two or three days in warm water, and is then ground on stones over which flows a stream of water. The material thus produced is next washed through a bolting cloth, and the starch separated by proper processes from the gluten. The starch is then beaten up with water until it becomes of a creamy consistency, and is conducted to the converting tubes, where it is treated with dilute sulphuric acid. During the process of conversion, which occupies about two hours, steam is allowed to bubble into the mixture. The acid is then neutralized by the use of marble dust and animal charcoal, and the liquid evaporated to the required concentration. There are other methods employed, but this is the most common.

The glucose thus produced is a thick, tenacious syrup, almost colorless, or of yellowish tinge, its specific gravity at 20° C. being 1.412. The degree of sweetness depends upon the extent of chemical change in the conversion of starch into sugar. If stopped as soon as the starch disappears the glucose has its maximum sweetness. As above mentioned grape sugar was made from wood fibre as early as 1819. Recently this material has been used to some extent in its manufacture, saw-dust and the wood clippings made in the wood-paper-factories being employed. The result is an inferior article of glucose, but not necessarily an unwholesome one.

In 1884 a committee of the National Academy of Sciences submitted a report on glucose, in response to a request made by the Commissioner of Internal Revenue. Their report declared that the sweetening power of starch sugar was about two-thirds that of cane sugar. Many experiments were made as to its healthfulness, it being taken internally in its ordinary state, in extracts that retained every ingredient that could be objectionable, and in concentrated extracts from fermented glucose without the slightest deleterious effect. The committee concludes that the present processes by which sugar is made from maize "are unobjectionable in their character, and leave the product uncontaminated." "That the starch sugar thus made and sent into commerce is of exceptional purity and uniformity of composition, and contains no injurious substances." And "that, though having at best only about two-thirds the sweetening power of cane sugar, yet starch sugar is in no way inferior to cane sugar in healthfulness, there being no evidence before the committee that maize starch sugar, either in its normal condition or fermented, has any deleterious effect upon the system, even when taken in large quantities."

Glucose is used chiefly in the manufacture of table syrups and confectionery, in the brewing of ale and beer, and to some extent as food for bees and in the making of artificial honey. No reliable statistics can be had as to the quantity used in brewing, since brewers seek to conceal the fact of its employment. When it is fed to bees the honey yielded by the bees is almost pure glucose. In artificial honey-making the comb is made of paraffine and filled with pure glucose by machinery. For whiteness and beauty it rivals the best white-clover honey, and can be sold at less than half the price. Its one defect is that it is not honey. Glucose is very largely used in candy-making, and has greatly reduced the consumption of cane sugar in this industry, with considerable detriment to the sweetness, though not to the wholesomeness, of the product. For table syrup it is mixed with a small percentage of cane-sugar syrup. In the form of grape sugar it is used to adulterate table sugar. (C. M.)

GNEIST, RUDOLPH, a German jurist, was born at Berlin, Aug. 13, 1816. Educated at Eisleben he studied jurisprudence at Berlin, and in 1833 was made auscultator, in 1841 assessor before the Superior Court, and after journeys in Italy, France, and England in 1844 professor extraordinary. In 1850 he abandoned his judicial career and devoted himself to lecturing, writing, and parliamentary activity. His lectures on English nobility, knighthood, elections, and constitution attracted much attention. Since 1858 he has been a member of the Prussian Chamber of Deputies, acting with the moderate liberals. He advocated the adoption of many ideas taken from British usage, a greater amount of local self-government, attention to the welfare of the working classes, and reform of the judicial and penal systems. In the autumn of 1883 he visited the United States. Besides many smaller works his publications include *Syntagma Institutionum* (1858; 2d ed., 1880); *Das heutige englische Verwalt-*

ungsrecht (1867; 3d ed., 1883); *Englische Verfassungsgeschichte* (1882).

GOAT, ANGORA. This goat (*Capra Angoriensis*), an entirely different species from the common goat, takes its name from the Province of Angora, in Asia Minor, its present most important habitat. It seems most probable the Angora was originally native in the mountains of Thibet. The locality in Asia Minor where the goat husbandry is most successful is from 2000 to 5000 feet above tide-water, with a very dry temperature, hot in summer and cold in winter, with deep snows, commencing from November on, and remaining until March or April, and then going off in a body. The best results in the health and products of the goats are obtained in these elevated districts among the Taurus Mountains. The absence of much humidity in all seasons is an important factor in giving to the fleeces strength, length, fineness, and lustre, and in preventing the shedding or falling off of the hair until the approach of warm weather, when it is natural for the goat to throw off his fleece like an overcoat. The food of the goat in its native ranges, and on which it seems most to thrive, in flesh and fleece, is the bunch-grass and scrub-oak and pines of the region during the summer, and this material is gathered and stored for winter use. The hair of the Angora in its best condition is white, from four to twelve inches long, strong, fine, and lustrous as silk, with an average yield of five pounds to the animal. The average cost of maintenance is about one-half that of sheep, while it is less subject to disease and more hardy every way than that animal. The Angora is tractable, intelligent, easily handled, and can be herded in large flocks with little care and much profit. Yet it is undoubtedly true of the Angora-goat husbandry, as of that of other animals, that intelligent care and seasonable and varied food is an important factor in the attainment of the best and most profitable results. In its purity the fleece of the Angora is white, hanging in wavy or corkscrew ringlets, covering the short and harsh hair of the skin. The flesh, by the testimony of all familiar with its use, is not in any sense inferior to the best mutton. The cross with the Maltese goat has shown remarkable milking qualities.

One of the most remarkable and valuable traits of the Angora is the facility with which the young of the cross, between the thoroughbred Angora male and the female of the common goat, assumes all the marked characteristics of the former. Intelligently bred, good results are obtained at the third cross, and perfection at the fifth and sixth crosses. It is indispensable, however, that thoroughbred Angora bucks be invariably and always used for propagation, as the use of even the highest grade sire gives uncertain results and tends rapidly to a reversion to the common stock.

Mohair, the name by which the fleece of the Angora is known in commerce, is adapted for certain defined uses in the arts, as distinct as silk, wool, or cotton. It has the appearance of silk without its suppleness. It does not felt like wool, is dyed with great facility, taking with equal readiness all colors, and in all the fabrics made from it retaining its fibres distinctly separated. Its qualities of lustre and elasticity with its great durability eminently fit it for the manufacture of braids, hat-bands, bindings, and plushes—especially in the latter for cane-seats and general furniture use. In the works of Bradford and Saltaire in England, and the mills of Lyons and other localities of France, it is very successfully woven with silk, woollen, and cotton, making a distinct and most beautiful class of fabrics. One of the latest of its uses is in the manufacture of imitation furs, in squirrel, seal-skin, etc. It is difficult at a little distance to distinquish the mohair fabric from these materials, while in wearing qualities the product of the Angora fleece is not inferior, and in cost much less. The Angora skin, with the hair on, takes any dye, retaining the lustre, and makes an elegant rug or robe. Tanned, it is the famous Turkey Morocco of commerce, though in the more extended uses of modern times superseded by the skin of the common goat. The Angora goat is among the most valuable of lanigerous animals. It is not strange, therefore, that the governments of England, France, Germany, and other European nations have expended much labor and money in the effort to plant and foster the husbandry in their various localities during the past century. None of these attempts have in any large sense proved successful, and they have, one after another, been abandoned. The lack of success is attributed by the agricultural authorities of these countries to extreme humidity in England, and lack of range, suitable feed, and intelligent supervision in the other countries. In a limited way the industry has been planted in Australia and the United States within the past thirty years. In the former, largely under the supervision of Sir Samuel Wilson, now the owner of the manor of Hughenden, England, and the residence of the late Earl of Beaconsfield. In the United States, from the first and until now, the industry has thrived under the care and on the lands of Col. Richard Peters, of Atlanta, Ga., who still owns much the largest flock of thoroughbred bucks and ewes in the country. Smaller pure-blood flocks, and larger ones of graded animals, may be found in Kentucky, Tennessee, Texas, California, and some of the Territories west. Renewed attention is now called to the subject by the publication, by Hon. John L. Hayes, secretary of the National Association of Wool Manufacturers, of an elaborate, scientific, and practical treatise upon the *Angora Goat and the Mohair Industry*.

This husbandry has been transplanted and is at present most successful at Cape Colony, South Africa, 600 thoroughbred bucks and ewes having been imported from Asia Minor. In 1865 the mohair product was 6000 pounds of a fair quality. In 1882 the yield of the district was over 3,000,000 pounds, and much of it of a quality that rates as high as the best of Asia Minor. Success there is due to a location in the high table-lands very similar in all respects to those in Angora, with a like climate, to the carefully selected importations, and intelligent supervision in breeding and rearing flocks. Of course such a product could be only from graded flocks. But the sires were and are always thoroughbred, and the grades have been skilfully bred up and maintained by constant selection and the weeding out of inferior animals. As the cost on the average in the Angora flocks is not over two-thirds that for maintenance of a like number of any breed of sheep, while the returns in sales on the mohair of the high grades is fully up to that from the best grades of combing wools, it will be seen the balance is largely in favor of the Angora-goat husbandry.

In the United States there are millions of acres of cheap and unoccupied lands as favorable in soil and location as any in Asia or Africa for this industry. They can be as profitably utilized as that of Cape Colony for an equally well-conducted industry. It becomes, therefore, an important question in the future economy of the country what improvement is made of these industrial resources. Three firms in the country have proved by actual use in their manufactures the superiority of American-grown mohair, and have issued public notice they will take and pay good prices for all the mohair from the first cross to thoroughbred product that can be raised in the country for years to come. We have seen, also, from the hands of an American tanner and dyer, as good results in leather and in the skins cleansed and dyed for rugs and robes as we have ever met in fabrics from the artisans of Turkey or France. One of the uses to which the selected and best products of the Angora flocks in Asia Minor are applied is, as a substitute among the artisans of Persia and India, and also those of France, for silk, in various dress-fabrics, velvets, etc. By its use there is no depreciation in fineness, lustre, or strength in the mingled silk and mohair fabric; but there is a great economy, as standard thoroughbred mohair of the requisite quality can be had, and pay the shepherd richly for his investment, at one-third to one-half the cost of silk that would be required for the same purpose were the whole fabric made of that material. (C. W. J.)

GOBAT, Samuel (1799–1879), Anglican bishop of Jerusalem, was born at Cremine, Switzerland, Jan. 26, 1799. In 1821 he entered the Mission House at Basle, and after studying Arabic and Æthiopic in Paris, he entered the service of the Church Missionary Society and was sent to Abyssinia, but on account of wars in that country he spent three years in Cairo. Reaching his field of labor in 1830, he gained the confidence of some princes, who gladly received from him an Amharic translation of the Gospels. Returning to Europe on renewal of the war, he gave the first accurate account of the Æthiopic churches. A second missionary journey, undertaken in 1835, was ineffectual because of his severe illness. In 1839 he became principal of the Missionary College at Malta, where he translated the Bible into Oriental languages. In 1846, in pursuance of an agreement between the governments of England and Prussia, the missionary bishopric of Jerusalem was created, and Dr. Gobat, who was nominated by the king of Prussia to be the first bishop, was consecrated at London, July 5, 1846, and in the following December proceeded to Jerusalem. He took general superintendence of the interests of Protestantism in Palestine and founded schools in connection with many congregations. Though he was personally respected for piety and zeal, the movement was ineffectual in promoting union among the various Christian bodies represented in Palestine. He died at Jerusalem, May 12, 1879.

GOBINEAU, Joseph Arthur, Comte de, a French diplomatist and author, was born at Bordeaux in 1816. At an early age he was employed in the office of foreign affairs and became secretary of legation at Berne in 1851. He was sent as ambassador to Persia in 1861, to Greece in 1864, to Brazil in 1869, to Sweden in 1872, and in 1877, at his own request, was permitted to retire. He was active in anthropological, philosophic, and literary pursuits, and used his opportunities in various countries to further his studies. His works comprise *Essai sur l'inégalité des races humaines* (4 vols., 1853–55); *Trois ans en Asie* (1859); *Les Religions et les philosophes dans l'Asie centrale* (1865); *Histoire des Perses* (1869); *Souvenirs de voyage* (1872); *La Renaissance* (1877). Besides other poems he published *Les Cousins d'Isis* (1844), an epic poem, *Amadis* (1876), and a historical novel, translated into English by Dr. C. D. Meigs, *Typhaines Abbey* (1867).

GODFREY, Thomas (1704–1749), an American inventor, was born near Philadelphia in 1704. He was by trade a glazier, and, being greatly devoted to mathematics, studied Latin that he might read important treatises. In 1730 he communicated to James Logan, secretary of Pennsylvania, the improvements he had made in Davis' quadrant. Logan sent an account of the invention to Edmund Hadley, of London, but, no answer being received, Peter Collinson laid a statement of Godfrey's invention before the Royal Society in 1732. In the meantime Hadley had presented a paper describing a similar improvement as made by himself. The society, upon investigation, decided that both were entitled to the honor, and a reward of £200 was bestowed upon Godfrey. Godfrey was a member of Dr. Franklin's "Junto." He died in Philadelphia in 1749 and was buried on his farm near Germantown, but in 1838 J. F. Watson, the Philadelphia antiquarian, caused his remains to be removed to Laurel Hill Cemetery.

GODKIN, Eugene Lawrence, an American journalist, was born at Moyne, county Wicklow, Ireland, Oct. 2, 1831. He graduated at Queen's College, Belfast, in 1851, and became connected with the London press. During the Crimean war he was correspondent of the London *Daily News*, and at its close came to the United States, and made a journey on horseback through the Southern States, which he described in the same paper. Settling in New York, he was admitted to the bar there in 1858, but continued to contribute to the press. In 1865 he was made editor of the *Nation*, a weekly literary and political paper, of which he was afterwards also proprietor. In 1879 this journal was combined with the New York *Evening Post*, Mr. Godkin retaining a prominent place in its management. He has been in the main a supporter of the Republican party, though criticising severely its leaders and measures. In recent years the movements for civil service reform and of revenue reform have chiefly engaged his attention.

GODMAN, John D. (1794–1830), an American physician and naturalist, was born at Annapolis, Md., Dec. 30, 1794. Left an orphan at an early age, he was apprenticed to a printer, but afterwards studied medicine, and obtained his degree at the University of Maryland in 1818. He practised at New Holland, Pa., Baltimore, and Philadelphia. For a short time in 1821 he was at Cincinnati as professor in the Ohio Medical College. He returned to Philadelphia in 1822, and, amid the requirements of an extensive practice, found time for literary pursuits. In 1826 he was made professor of anatomy in Rutgers Medical College, New York, but his course was interrupted by illness, and he removed to Germantown, Pa., where he died, April 17, 1830. He published *Natural History of American Quadrupeds* (3 vols., 1826); *Rambles of a Naturalist*, and several anatomical treatises.

GODON, Sylvanus W., an American admiral, was born in Pennsylvania, June 18, 1809. He entered the navy as midshipman, March 1, 1819, and became lieutenant Dec. 17, 1836. He was attached to the bomb-brig Vesuvius in the siege of Vera Cruz, in 1847, and to the steamer Susquehanna in the East Indian squadron, in 1851–53. He commanded the sloop-of-war Powhatan in Commodore Dupont's expedition to Port Royal, S. C., in 1861, and was made captain in July, 1862, and commodore in January, 1863. He commanded a division of Commodore Porter's fleet at Fort Fisher, in December, 1864. After the war he commanded the South American squadron on the coast of Brazil, 1866–67, and had charge of the New York navy yard for two years. He retired from service June 18, 1871.

GODWIN, Parke, an American journalist and author, was born at Paterson, N. J., Feb. 25, 1816. His father was an officer in the war of 1812, and his grandfather a soldier in the Revolution. Parke graduated at Princeton College in 1834, studied law, and was admitted to the bar in Kentucky. From 1837 to 1853, with the exception of one year, he assisted his father-in-law, W. C. Bryant, in editing the New York *Evening Post*. He was an early advocate of free trade and of the socialist doctrines of Charles Fourier. In 1845 he was appointed a deputy collector in the New York custom-house. In the *Democratic Review* he advocated many reforms, which were afterwards embodied in the constitution and code of New York. In 1853 he was one of the editors of *Putnam's Monthly*, and from his contributions to both series of this magazine (1853–57, and 1867–70) two volumes have been gathered: *Political Essays* (1856), and *Out of the Past* (1870). In 1860 appeared the first volume of his *History of France*, treating of ancient Gaul, down to the reign of Charlemagne. He also published a *Hand-book of Universal Biography* (1851), afterwards enlarged into a *Cyclopædia of Biography* (1865). After 1865 Mr. Godwin was again associated with Bryant in editing the *Evening Post*, until 1873. He has published an excellent *Biography of William Cullen Bryant* (1883).

GOFFE, William (*c.* 1605–1679), an English regicide, was born about 1605, being the son of a

Puritan clergyman. He became one of Cromwell's major-generals, and was one of the judges who signed the death-warrant of King Charles I. Before the restoration of Charles II. he came to America with his father-in-law, Gen. Edward Whalley, arriving at Boston in the summer of 1660. They were received courteously by Gov. Endicott, and resided for a time at Cambridge, Mass. But when the king issued a proclamation, offering a liberal reward for their arrest, and officers were sent from England after them, the regicides went to New Haven, where they were favored by Rev. John Davenport, though often compelled to hide in mills and among the rocks. The "Regicides' Cave" is still pointed out near New Haven. In October, 1664, they went to Hadley, Mass., where they lived at the house of Rev. Mr. Russell for many years in seclusion. In 1675 the citizens were called forth from the meeting-house to resist an attack of Indians. Suddenly Goffe put himself at the head of the citizens who were standing irresolute, and led them to victory. But when he disappeared as quickly as he had come, the astonished inhabitants believed that an angel had come to their deliverance.

See Vol. X. p. 759 Am. ed. (p. 740 Edin. ed.).

GOLD, a chemical element belonging to the class of metals, from the remainder of which it is distinguished by its bright yellow color and its unequalled ductility and malleability. Its softness is nearly equal to that of lead. It is soluble to some extent in acids, but is highly resistant to oxidation. Its specific gravity is very high, being about 19, its atomic weight a little over 196, and its melting-point between 1200° and 1400° C., according to different estimates. This metal has been always held in the highest estimation by mankind, from its beauty of color and lustre, its resistance to oxidation, the facility with which it can be wrought into artistic shapes, and its scarcity, which has brought it into use, from an early period, as a medium of exchange. Among the oldest relics of semi-civilized man in Europe articles of gold are prominent, and they were then apparently held in as high esteem as now. When America was discovered its civilized nations were found to set a like value on gold, and to the present day its costliness and beauty restrict its use to purposes of coinage and ornament, and to the highest class of articles of utility.

Gold, as found in its native state, exists as small grains, spangles, minute crystals, hair-like fibres, and dendritic incrustations. In placer deposits the particles are more or less rounded by friction, and occasionally lumps or nuggets occur, varying from a few ounces to considerably over 100 lbs. weight. According to the opinion of Dr. Genth, these lumps were formed by the gradual aggregation of grains in drift waters. Gold is usually found in the older metamorphic and slaty rocks, mainly in steatitic, talcose or chloritic slates and shales, and in granite or greenstone rocks, ranging from the earliest geological period down to the secondary age. The California gold-bearing shales are among the more recent, being of Jura-Triassic age. It is disseminated finely and sparsely throughout the substance of these rocks in very many regions of the earth, but is found more abundantly in quartz-beds and veins which penetrate them. It is most abundant where iron pyrites, titaniferous iron, or other iron ores prevail, and seems to exist in all sulphurets, but most fully in sulphuret of iron, or iron pyrites. It is never found in solid veins, but usually associated with other metals and minerals, in infiltrated or erupted veins which traverse the fissures of the slates. The grains of gold are often imbedded in masses of quartz, and are usually alloyed with a little silver, which diminishes the value from 15 to 20 per cent. The grains in the Virginia and North Carolina mines are often so small as to be invisible to a strong lens, even when present to the extent of $3 or $4 per bushel of ore.

These facts have led to a theory as to the original mode of deposition of gold, which is of interest, and may be briefly stated. The waters of the ocean now contain gold in very small quantity. How and when they obtained it, we are, of course, unaware, but it is not improbable that this ocean gold may be the main source of the existing rock deposits. The slates which contain it were originally deposited as mud on the ancient sea-bottoms, and it is supposed that this settling mud carried down small quantities of gold, then more abundant in sea-water than now. After the upheaval of the slates, and the various influences to which they were subjected, much of their contained gold was dissolved, and accumulated with silica and metallic sulphides in the fissures of the slates, as the now existing veins. It is quite probable, also, that more or less of this fissure gold came directly from the original source of the ocean gold, the primordial rocks. Here it may have been liquefied, or even vaporized, by the intense heat there prevailing, and driven upwards together with the other contents of the veins, like volcanic lava.

Subsequently to the formation of the veins, the sulphurets, which principally carried the gold, were dissolved by atmospheric action, and left the gold in a still more available form along the backs of the veins. Still later came the action of rains, glaciers, river-water, and other denuding agencies, carrying away the materials of the veins, and depositing the gold in the gravel-beds of ancient and recent streams. Through the gravel it made its way, by its superior weight. to the bottom, where it gained its greatest concentration. This final process took place in the Quaternary era, just before and after man's advent upon the earth. It formed the placer deposits, the source of all the gold known to man until some forty or fifty years ago, when quartz-mining first began. The gold which now exists in sea-water is estimated, from experiments made by Soustadt, at about one grain to the ton. This would make a dollar's worth of gold in twenty-five tons of sea-water. Yet, according to the calculation of Prof. Wurtz, all the gold yet extracted from the earth, which, at the date of his calculation, was estimated at about $2,000,000,000, would give only one dollar for 280,000,000 tons of sea-water. The quantity of gold in existence, therefore, is immensely greater than that possessed by man, and the amount disseminated through the rocks is probably very great. Yet it is only available for mining where accumulated in fissure veins, or washed out into placer deposits. In these veins, whose main mineral is quartz, the gold is almost always associated with pyrites, which usually form from one to three per cent. of the substance of the vein. Of pyrites, the sulphuret of iron is most common, though copper, lead, and arsenical pyrites are common. Above the subterranean water-level the pyrites have largely disappeared, being decomposed by air which penetrates the rocks. This decomposition usually extends to a depth of thirty to sixty feet. The veins to this depth are more easily worked, and the gold, which has been set free, more readily obtained. All such veins, however, do not contain gold, nor possess it in equal quantities. Miners often abandon a lode when they have penetrated to the level of the undecomposed rock, knowing from experience the much greater difficulties of working this hard material.

Gold has been, from a very remote period, extracted by washing or otherwise from the sands and gravels of river-beds, where its yellow, glistening lustre must have early attracted the attention of man. There is scarcely a region of the earth in which it is not found, its wide-spread dissemination through the slates being strong evidence in favor of the theory of its extraction from the ocean waters. There is hardly a country in Europe in which it does not exist in workable quantities; it is found in many Asiatic regions, and it has long been an article of export from Africa.

It occurs abundantly in Australia, and is found very widely throughout both North and South America. Whether any very rich deposits, similar to those of California and Australia, will again be discovered, is very doubtful. Yet it is by no means impossible. Gold was sought in California for two or three centuries before the great discovery was made, and there are many localities of the earth which have not yet been "prospected." In addition to the two localities above named, the Siberian slope of the Ural Mountains of Russia is the most prolific locality. Here, several attempts have been made at vein-mining, but they have been abandoned for placer-mining, which yet prevails. The most prolific year was 1847, when 75,000 pounds of gold were obtained.

The earliest known gold deposits of the United States were those found on the slopes of the Appalachian mountain system, at various points, from Nova Scotia to Georgia. Gold-washing seems to have been carried on in very early times by the southern Indians, since an ancient Indian mining village, built on the gold-gravels, and with relics of rude mining-tools, has been found nine feet beneath the surface in Nacooche Valley, Georgia. Gold is also found in strata similar to the Nova Scotian on the northern shore of Lake Superior. It has long been mined in the Appalachian region, particularly in Nova Scotia, Virginia, North Carolina, and Georgia. About the beginning of this century, the famous Cabarrus nugget, of 28 pounds' weight, was found at the Reed mine, North Carolina. But the greatest gold excitement in the South followed the discoveries in Georgia, from 1828 to 1830. The maximum product was obtained from 1828 to 1845, probably not more than $600,000 being mined in any one year. Since that period the output has declined, the product of the eastern division in 1880, from Maine to Georgia, being $239,640, of which $200,000 came from Georgia and North Carolina.

The Spaniards, who held California from the sixteenth century, were always in search of the precious metals, yet were not successful in finding any of the important deposits of gold. Cortez knew of the existence of gold in Lower California, and sent an expedition there in 1537, which brought back a small quantity. Its existence in Upper California was discovered by Drake's expedition, in 1577–79, and is noticed in Hakluyt's account of that region. Other mentions of gold-findings were made from time to time, several of them in the first half of the present century. But the earliest discovery of importance was that made by Marshall, in January, 1848, when the first rush of water through Sutter's mill-race washed away the concealing dirt, and revealed the shining particles of gold in the gravels. The report of this discovery gave rise to the first of those mad rushes for wealth which marked the history of the Pacific region for many years afterwards. They had plentiful warrant, for a deposit of gold had been unearthed such as the world had never before known, and which has only been rivalled by the similar Australian discovery of 1851. Of the latter, we can but say here, that it has closely paralleled the California deposit in value, the average gold output of Australia falling but little short of that of the Western United States.

For several years the California mining was confined to washings of the sands and gravels of the surface placer deposits. But it was soon found that the gold beds were not confined to the gravels of recent streams, but also existed in more ancient gravels, in the channels of vanished streams, frequently covered with strata of lava or other material. The working of these deeper gravels necessitated hydraulic mining, which began in a small way in 1854, but did not become important till after the civil war. Vein-mining began in California about 1860. It has not yet become very important in that State, but has been greatly developed in Nevada, though here silver forms the chief volume of the product. The mines of the Comstock lode are worked at an average depth of 2000 feet, though some are nearly half a mile in depth. Gold seems to exist throughout the whole length of the coast-range, from Alaska to Mexico, and in other branches of the Rocky Mountains, and profitable mining has been done in every State from British Columbia southward, though the value of the product is everywhere declining. The largest annual product was that of 1853, amounting to about $65,000,000. The total gold product of the United States, from 1776 to 1847, is variously estimated at from fifteen to twenty millions of dollars. The total output to June 30, 1883, is estimated at $1,632,364,670. The decline in the value of gold obtained, however, steadily holds good, the product of 1877 being estimated at nearly $47,000,000; of 1880, at $36,000,000; of 1881, at $35,000,000; and of 1882, at $32,500,000. The product of the mines of the United States at present is about one-third that of the whole world, the Australian product being nearly another third. In regard to the cost of producing this gold, various estimates have been advanced, some writers holding that every dollar gained has cost a dollar in labor or machinery. This, however, is somewhat extravagant, and a late writer puts the net profit of working the Pacific mines at $500,000,000. See METALS. (C. M.)

GOLDEN-ROD is the popular name for the whole genus *Solidago*, which is among the best known of American genera. The genus is closely related to *Aster*, and is described as having either few or many flowers in a head, and the heads radiate, the rays rarely more than 16, and pistillate. The scales of the oblong involucre are oppressed, and, except in one instance, destitute of herbaceous tips so common in *Aster*. The receptacle is small and not chaffy. The achenia are many-ribbed, and nearly terete. The pappus simple, of equal capillary bristles.

The members of the whole order of *Compositæ*, to which this belongs, have so many points in common that it is very difficult to define the genus briefly. When the genus is once known, the species belonging to it are more readily recognized by their appearance than by any written generic character. These more popular features are thus described by Dr. Gray: "Perennial herbs, with mostly wand-like stems, and nearly sessile stem-leaves, never heart-shaped. Heads small, racemed or clustered; flowers of the disk and ray (except rarely) yellow."

There are over a hundred species, inhabiting chiefly the eastern portion of the American continent, extending from the Arctic regions to Mexico and Brazil. A few scattered species are found on the Pacific coast from Unalaska to Chili. One species, *Solidago Virga Aurea*, is found in many varying forms all over the north of Europe, North America, and Northern Asia. This species was famous during the Middle Ages for its supposed medical properties.

Though it has now no known use in the arts, it forms one of the most striking elements in the beautiful autumnal scenery of North America, and is constantly referred to by poets. (T. M.)

GOLDSBOROUGH, LOUIS MALESHERBES (1805–1878), an American admiral, was born at Washington, D. C., Feb. 18, 1805. He was the son of Charles W. Goldsborough, who was governor of Maryland in 1818–19. Louis entered the navy as midshipman in 1821, became lieutenant in 1825, and in 1827 joined the North Carolina, which was cruising in the Mediterranean. Here, with 35 officers and men, he captured a pirate vessel, after killing 90 of her crew. In 1833 he conducted a colony of Germans to Florida to cultivate lands belonging to his father-in-law, William Wirt, and took part in the Seminole war. In September, 1841, he was promoted to be commander, and at the siege of Vera Cruz in 1847 he was second in command. After the Mexican war he was sent to explore California and Oregon, and was superintendent of the U. S. Naval Academy at Annapolis from 1853 to 1857. In August, 1861, he was flag-officer of the North Atlantic blockading squadron, and was associated with Gen. Burnside in the expedition to Roanoke Island. He dispersed the fleet which had been gathered by Commodore Lynch in Pamlico Sound. In 1862 Goldsborough was made rear-admiral, and after the war he commanded the European squadron. He died at Washington, Feb. 20, 1878.

GOLDSCHMIDT, Jenny, a Swedish vocalist, best known by her maiden name, Jenny Lind, was born at Stockholm, Oct. 6, 1821. She was the daughter of a teacher of languages and at a very early age could sing correctly any piece she had ever heard. When nine years old she was placed under the instruction of Croelius, the best teacher in Stockholm. Soon she appeared on the stage in juvenile parts, showing dramatic ability in addition to her vocal accomplishments. Then the upper notes of her voice lost their sweetness and until she was sixteen she was forbidden to sing, though she studied instrumental music. On one occasion part of Meyerbeer's *Robert le Diable* was to be performed at a concert, and no vocalist could be found to appear as Alice. The director of the academy applied to Jenny Lind, who, taking the place, showed that her voice had recovered its purity and power. The manager then asked her to take the part of Agatha in Weber's *Freischütz*, and for nearly two years she continued to be the prima donna of the Swedish opera. After a series of concerts in Norway and Sweden, she went to Paris to receive the instruction of Garcia, who did not encourage her at first, but she persevered and after a year obtained the approval of Meyerbeer. She returned to Stockholm, where she enjoyed a remarkable triumph, and in 1844, on her appearing at the opening of the opera house in Berlin, her reputation was firmly established. She went to Dresden, Frankfort, Cologne, and Vienna, and sang before the Queen of England, who was visiting Berlin. In May, 1847, for her debut in London she selected the part of Alice, which had first shown the sweetness of her voice. Her répertoire was large, and her success was unprecedented. In her first season she appeared in *Sonnambula*, *La Figlia del Reggimento*, *Norma*, and *Der Freischütz*, and she soon added other parts. In consequence of a popular demand she appeared at Exeter Hall in 1848, in the oratorio of *Elijah*, and she also gave many concerts. In September, 1850, she came to America under the auspices of Mr. P. T. Barnum. Her first concert at New York was preceded and accompanied by scenes of the wildest enthusiasm. The sale of seats was by auction, and hundreds of dollars were bid for the best choice. After giving about one hundred concerts in the principal cities with equal success, and receiving over $300,000 as her share of the proceeds, she withdrew from her contract with Mr. Barnum and gave a series of concerts on her own account. In 1851 she was married to Mr. Otto Goldschmidt, who had accompanied her as pianist. She returned with him to Europe, and having retired from the stage took up her residence at Dresden. Subsequently she made her home in England, where she appeared again in public for brief periods in 1855, 1861, 1863, 1864, 1866, and even later. These have chiefly been for charitable objects, and from the commencement of her career she spent much money in this way. Since 1858 she has resided in England. She was popularly known as the Swedish Nightingale. Her voice was a clear and remarkably sweet soprano, with a register of 2½ octaves. She entered with her soul into whatever she sang, and seemed equally able to express the deepest or lightest emotions, and to gratify the most refined as well as the most simple tastes.

GOLD-THREAD, *Coptis trifolia* of modern botanists, *Helleborus trifolius* of Linnæus. This is a Ranunculaceous plant, differing from the hellebores by having deciduous sepals, and the few-seeded pods set on slender stalks, as well as by some other characters of interest to the critical botanist. It is found from Denmark through Russia to Siberia, and crossing Behring's Straits over the American continent to Iceland. It is a small, creeping plant, the leaves somewhat like those of the strawberry, but much smaller, and evergreen under the snow—the scape not often exceeding five inches high. The flowers are small and white. The name *Coptis* is from the Greek *kopto*, to cut, in allusion to the divided leaves.

As the "gold-thread" it is popularly known in the Northern United States and Canada; the name being given to the underground running root-stocks, which the plant abundantly produces in the bogs and damp places wherein it loves to grow. It was a popular remedy with the Indians of the North for sore mouths and ulcerated throats. It is still used by the French Canadians for the same purposes, and under the name of *Tissa-voyanne jaune* little bundles of the silk-like roots are common in the French markets of Montreal. Bigelow, in his *Medical Botany*, doubts whether it has any real merit in these particulars, but its popularity in the North after so many years of use is somewhat in its favor. It is a pure bitter tonic, free from astringency, and Rafinesque says a tincture made with an ounce of the roots in a pound of diluted alcohol, given in doses of a teaspoonful thrice a day, is of undoubted value as a tonic during convalescence after fever. The Indians made a dye from the stems and leaves, by which they colored skins and other articles a saffron yellow.

GOODE, George Brown, an American ichthyologist, was born at New Albany, Ind., Feb. 13, 1851. He graduated at Wesleyan University, Middletown, Conn., in 1870, and having studied also at the Museum of Comparative Zoölogy in Harvard University, was made curator of the museum in the Wesleyan University. In 1874 he was appointed an assistant in the United States Fish Commission, and in 1880 chief of the division of fisheries. His services were called for in connection with the Halifax Fisheries Commission and with the census of 1880. In 1875 he was made assistant curator of the United States National Museum, in 1878 curator-in-chief, and in 1881 assistant director of the same. He has taken part in the Fisheries Exhibitions at Berlin (1880), at London (1883), and at New Orleans (1884). He has published *Fishes of Bermuda* (1876); *History of the Menhaden* (1880); *Game Fishes of the United States* (1879–81); *Food Fishes and Fishery Industries of the United States* (1884); *Bibliography of American Naturalists* (Part I., 1884), and many articles and pamphlets on similar subjects.

GOODELL, William (1792–1867), an American missionary, was born at Templeton, Mass., Feb. 14, 1792. He graduated at Dartmouth College in 1817, and at Andover Theological Seminary in 1820. After some missionary work among the Cherokees and Choctaws, he was ordained Sept. 12, 1822, and then, under the direction of the American Board of Commissioners for Foreign Missions, he went to Beyrout, Syria, where he labored five years amid great perils. In 1831 he removed to Constantinople, where he likewise experienced many hardships, being compelled to change his residence thirty-three times in twenty-nine years. He translated the Bible into Armeno-Turkish, completing the work in 1843. After seeing many fruits of his arduous labors, he returned to the United States in 1865, and thereafter lived in retirement at the residence of his son in Philadelphia. Here he died Feb. 18, 1867. His biography was published by his son-in-law, Rev. E. D. G. Prime, under the title *Forty Years in the Turkish Empire* (1883).

GOODRICH, Chauncey Allen (1790–1860), an American clergyman and author, was born at New Haven, Conn., Oct. 23, 1790. He was the son of Elizur Goodrich (1761–1849), a distinguished judge and professor of law in Yale College, and grandson of Rev. Elizur Goodrich (1734–1797), who was noted for his fondness for astronomy. Chauncey graduated at

Yale College in 1810, served as tutor two years, and was ordained pastor at Middletown in 1816, but soon returned to Yale to be professor of rhetoric, and in 1839 was transferred to the chair of pastoral theology. In 1828 Dr. Noah Webster, his father-in-law, intrusted to him the superintendence of the octavo abridgment of his original quarto dictionary. In 1847 Goodrich issued enlarged and improved editions of both of these dictionaries. In 1856 he published the octavo university edition, and in 1859 the unabridged quarto dictionary, with a valuable supplement. While engaged on the revised edition of 1864 Dr. Goodrich died at New Haven, Feb. 25, 1860. Besides his labors on *Webster's Dictionary*, he published some school textbooks. In 1829 he established the *Christian Quarterly Spectator*, and was its sole editor until 1836.

GOODWIN, William Watson, an American scholar, was born at Concord, Mass., May 9, 1831. He graduated at Harvard College in 1851, afterwards studied philology at Göttingen, Bonn, and Berlin, and received the degree of Ph. D. He was appointed Eliot professor of Greek at Harvard College in 1860. His principal work is *Syntax of the Moods and Tenses of the Greek Verb* (1860), in which he has made valuable elucidations of the principles of the Greek language. He has also published a *Greek Grammar* (1870; revised ed., 1879) and a *Greek Reader* (1871); revised a translation of *Plutarch's Morals* (1870), and contributed to philological publications. He has received the degree of LL. D. from Amherst College (1881), and from the University of Cambridge, England (1883).

GOODYEAR, Charles (1800–1860), the inventor of vulcanized India rubber, was born at New Haven, Conn., Dec. 29, 1800. After receiving a common school education he entered into partnership with his father in the manufacture of hardware at Philadelphia. After the failure of the firm in 1830, Charles began to give attention to the manufacture of India rubber, which had already been employed for boots and shoes. His first patent, September, 1835, was for an India rubber cement, which proved of little use, as it melted in warm weather. Goodyear exhausted his means in experiments, but in the midst of dire poverty persevered until he discovered the nitric acid process, by which the surface of the rubber was freed from its adhesiveness. In 1838, having gone to Roxbury, he found Nathaniel Hayward, who had been employed in a rubber-shoe factory, using sulphur to prepare the rubber. A patent for this process was taken out by Goodyear as Hayward's assignee in 1839. But it was still incomplete, and Goodyear continued begging and borrowing to make further experiments. Ten years after he had begun his investigations came an accidental discovery of the advantage of applying a high degree of heat to the sulphurized India rubber. For this vulcanized rubber he took out a patent in France in April, 1844, but his failure to comply with some formalities required by the law rendered his patent void. In England his endeavors to obtain a patent were frustrated by a person who, having received some hints of his process, anticipated him. In the United States vulcanized rubber was first patented by him June 15, 1844. This patent was afterwards renewed and extended, yet, owing to the enormous expenses incurred in maintaining his rights, Goodyear derived little benefit from it. At the World's Fair in London in 1851 he obtained the great council medal, and at the Paris Exhibition in 1855 the grand medal of honor. Before his death vulcanized rubber was employed for nearly 500 purposes, yet the inventor died in poverty in New York, July 1, 1860.

GOOKIN, Daniel (1612–1687), an American soldier, was born in Kent, England, in 1612. His father brought him to Virginia in 1621, and during the Indian massacre of the next year held his plantation, now Newport News, against the savages. In May, 1644, Daniel, who had become a Puritan, removed to Cambridge, Mass. There he was cordially received and soon made captain of the militia and member of the house of deputies. In 1651 he was speaker of the house, and in 1652 magistrate. In 1656 he was made superintendent of all the Indians who had submitted to the government of the colony. On his visits to England in 1656 and 1657 he had interviews with Cromwell, then Lord Protector. In 1660 he returned to Massachusetts with the regicides Goffe and Whalley, and afterwards protected them. In 1681 he was made major-general of the colony. He died at Cambridge, Mass., March 19, 1687. His *Historical Collections of the Indians of Massachusetts*, bearing date 1674, was published in 1792, and his *History of the Christian Indians*, written in 1677, was published in 1835. A *History of New England*, also written by him, is lost.

GOOSE. See Fowl.

GOOSEBERRY. The attempts to cultivate the European gooseberry in the United States and Canada have, for the most part, failed. In some cases they succeed for several years after introduction, and reports of success find their way to the agricultural papers; but sooner or later the mildew appears, and when once it appears among the plants it never leaves them. By digging deeply about the plants from year to year, adding salt to attract moisture, covering the whole surface of the ground under the bushes, or by selecting a piece of ground naturally cool and moist, some continued success has been achieved. It has come to be conceded by most American fruit-growers that in limited districts in Nova Scotia and New Brunswick only can the European gooseberry be successfully grown. It would appear that its culture is also practicable in the moister parts of the Pacific region.

See Vol. X. p. 693 Am. ed. (p. 779 Edin. ed.).

But of late years one of the native species, *Ribes oxyacanthoides* of Linnæus (from which *R. hirtellum* of modern botanists is found not to be distinct), and which extends from the Atlantic to the Pacific in the upper portion of the North American continent, has received an improvement which renders the failure of the European species a matter of less importance. The fruit of this species has long been a popular article of food with the Indians. A large-fruited form was brought into cultivation many years ago by Abel Houghton, of Lynn, Mass.; since which some other varieties have been introduced; and now American gooseberries are very popular with American fruit-growers. They are extensively planted in New York, New Jersey, Pennsylvania, Delaware, and Maryland for the markets which look to these territories for their supplies, and are considered among the profitable small fruits. They are not more than half the size of the average European gooseberry, nor are they sweet enough to be particularly desirable to eat in a natural condition, as is the case with its European relative; but they make admirable tarts and preserves. They come into use just as the rhubarb season ends, and thus fill a place in the fruit-market which would be otherwise vacant. They hang so thickly under the pendulous branches as to be easily gathered into sheets by a small rake, and hence can be sold at comparatively low prices. They are not wholly free from mildew, but this attacks them so rarely as not to interfere with their general cultivation. (T. M.)

GOPHER, a word of somewhat varied application in natural history, as it has been given in different regions to several genera of rodents, to a land-tortoise, and to the wood and fruit of certain trees. The animals thus named are all natives of the United States, the genus of rodents best known by this name being the *Geomys*, some species of which are very abundant in the States west of the Mississippi. These are nocturnal, underground animals, the claws on their fore feet being developed into powerful digging implements. They are often called pouched rats, from their large external cheek-pouches. The pouched gopher (*G. bursaris*) is 8 to 10 inches long, of a reddish-brown color above, and ashy-brown beneath, with white feet. It burrows in sandy soils, raising the earth into little mounds. It feeds on grasses, roots, nuts, etc., and does considerable injury to vegetation by its destruction of roots. Another genus, *Thomomys*, mainly belonging to the Pacific coast, has received the same common name, from its close resemblance to *Geomys*. The California gopher, the largest species, is nearly as large as *G. bursaris*. Its root depredations make it very annoying to the farmer, and it is destroyed in considerable numbers by the use of traps and poison.

In some of the Western States the rodent genus *Spermophilus* is also called gopher, though more properly termed "prairie squirrel." It belongs to the marmot family. These animals have a long and squirrel-like tail, and well-developed cheek-pouches. They burrow in the Western prairies, and live on roots and seeds of plants, occasionally injuring the growing corn. The best-known species is the striped prairie squirrel, commonly called gopher in Iowa, Wisconsin, Minnesota, and Northern Illinois.

The tortoise thus called is the large land-tortoise of the Southern States (*Testudo polyphemus*). This animal is about 15 inches long. It has a nearly flat shell, with a thick plastran projecting beyond the carapace in front. The fore limbs are very large and thick, while the nails are strong and well adapted for digging. Its general color is brownish-yellow. It burrows in the ground, mainly in dry, sandy pine-barrens, and does some mischief by destroying roots. The adults are very strong and can move under a weight of 200 lbs. The flesh and eggs are esteemed as food. It is found in Florida, Georgia, and Alabama.

There is a Southern tree (*Cladrastis tinctoria*), which, like the wood of Noah's ark, is called Gopherwood, its wood heavy and very hard, and yielding a clear yellow dye. The gopher plum (*Nyssa capitata*), of the Gulf States, bears a large acid fruit, from which is made a conserve called "Ogeechee limes."

GORDON, Sir Arthur Hamilton, a British colonial governor, was born Nov. 26, 1829, being the youngest son of the fourth earl of Aberdeen. He graduated at Cambridge University and was private secretary to his father during his ministry, 1852–55. From 1854 to 1857 he was member of Parliament for Beverley. In 1858 he was attached to Mr. Gladstone's mission to the Ionian Islands. Since 1861 he has been governor of New Brunswick; of Trinidad (1866); of Mauritius (1870); of the Fiji Islands (1875), then just made into a British colony; and in 1880 he was made governor of New Zealand. In all of these positions he displayed administrative abilities of a high order. His niece, Miss C. F. Gordon-Cumming, has given an interesting account of two years spent under his administration under the title *At Home in Fiji* (1880).

GORDON, Charles George (1833–1885), an English general, commonly known as "Chinese Gordon" and "Gordon Pacha," was born Jan. 28, 1833. He was educated in the military academy at Woolwich, and entered the royal engineers as second lieutenant in June, 1852. He served in the Crimean war, and was wounded in the trenches before Sebastopol. After the peace he served on the commission to settle the Turkish and Russian boundary in Asia Minor. In 1857, and again in 1860, he took part in the English and French war against China. At the close of 1861 he journeyed from Pekin to the Chotow and Kalgan passes, on the Great Wall, and returned through Shensi and Tiayuen, a city previously unvisited by Europeans. When the Tai-pings were besieging Shanghai in February, 1863, Gordon offered his services to the Imperialists, and soon after was appointed to the command of the "Ever Victorious Army." After several hard fights he succeeded in rescuing the fertile districts which had fallen into the power of the brigands, and in saving the city of Hangchow from the fate of Nanking, which they had ruined. Towards the close of his campaigns his very name was sufficient to put an army of the rebels to flight. Soo-chow, which was the stronghold of the rebels, surrendered in December, 1863. Gordon was greatly vexed when their leaders were put to death by Li-Hung-Chang, who had the chief command of the Imperialist forces, and who obtained from his own government credit for much of Gordon's success. In May, 1864, Chanchu-Fu was captured, and Gordon, having accomplished his purpose, retired from the Chinese service in July. He resumed his place in the English army, being now lieutenant-colonel. In 1871 he was appointed English consul at the mouth of the Danube, and he remained there until in 1873 he was invited by the Khedive, Ismail Pacha, to carry on the work which had been begun by Sir Samuel Baker in Upper Egypt. Gordon was appointed governor of the Equatorial provinces, and in February, 1874, he marched at the head of 2000 Egyptian and negro troops to Gondokoro, on the White Nile. Here he established his head-quarters, and founded a line of fortified posts as far as the Great Equatorial Lakes. He met with great resistance from the slave-traders, whose nefarious practices he suppressed with a strong hand. The Khedive supported his efforts, raised him to the rank of Pacha, and in 1877 made him governor of all Soudan. In 1879 Gordon, finding his authority not sufficiently supported by Tewfik, the new Khedive, resigned his position. Returning to England he was greeted by the press as the "Uncrowned King," and various important international problems were pointed out as waiting to be solved by him. To the surprise of all he became military secretary to the Marquis of Ripon, who had just been appointed governor-general of India. But he had scarcely reached Bombay when he found that his new position was entirely unsuited to his character, and therefore resigned. He sailed to Hong-Kong and had pleasant interviews with Li-Hung-Chang, with whom he had been associated while crushing the Tai-ping rebellion. The chief object of his visit, however, was to prevent war between China and Russia, and in this he was happily successful. He returned to England in 1881, and after a brief holiday in Switzerland was ordered to the Mauritius as commanding royal engineer. In March, 1882, he was appointed major-general, and had for some months command of the colonial troops in Cape Colony. He was subsequently selected by the king of Belgium to take military command of the International Congo Region, but before he entered upon this position the successes of El Mahdi in the Soudan and the destruction of Hicks Pacha's army induced him to undertake a mission to Khartoum in the interest of peace. He set out in February, 1884, unattended by European troops, but soon found the difficulties constantly increasing and the British government little disposed to heed the calls he made for aid. El Mahdi steadily advanced, and at last invested Khartoum. Gordon managed to keep up communication with Gen. Wolseley, who moved too slowly to his aid. At last Gen. Stewart with the vanguard of Wolseley's army was cut off, and on Jan. 27, 1885, Gen. Gordon was treacherously slain by an Arab. The gates of Khartoum were then opened to El Mahdi, but in June following he also fell a victim to the storm he had excited.

Gen. Gordon's character was marked by a stern, self-denying, religious fanaticism, mingled with mysticism, which seemed altogether to belong to a Puritan soldier of the seventeenth century, rather than to a man of the nineteenth. He was utterly careless of rewards and honors, but gave himself with enthusiasm to whatever work he undertook, and had the faculty of inspiring the half-civilized tribes among whom his work was carried on with intense personal devotion to himself and faith in his power to accomplish his ends. Yet at last his death was due to failure in this very point.

GORDON, John B., an American general and statesman, was born in Upson co., Ga., Feb. 6, 1832.

He graduated at the University of Georgia, studied law, and was admitted to the bar. In 1861 he entered the Confederate army as captain of infantry, and was advanced by successive promotions to the rank of lieutenant-general. He was wounded eight times. In April, 1865, he commanded one wing of Gen. Lee's army when it surrendered at Appomattox. In 1868 he was the Democratic candidate for governor of Georgia, but was unsuccessful. In 1868 and in 1872 he was a delegate to the National Democratic Convention, and in the subsequent elections was chosen a Presidential elector. He was elected to the United States Senate in 1873, and was re-elected in 1879, but resigned.

GÖRGEI, Arthur, a Hungarian general, was born at Topporcz, in Hungary, Jan. 30, 1818. He entered the military school at Tuln, and in 1837 was appointed lieutenant in the Royal Life-guards, and subsequently in the Palatine Hussars. But in 1845 he resigned from the army to pursue chemical studies at Prague. In 1848 he offered his services to the National Hungarian government, and was sent against the Croats whom he soon forced to surrender. Kossuth then made him colonel and soon after general of the army defending the frontier against Austria. But his forces being insufficient for the task, he retreated before Windischgrätz, who entered Buda, Jan. 5, 1849. After further disasters and some successes which served to prolong the struggle, Görgei found the chief command given to the Polish general Dembinski. The army officers demanded the removal of the latter and Kossuth yielded. Görgei, though opposed to the unconstitutional actions of the Austrian emperor, was not a Republican, and hence was distrusted by Kossuth's government, while his popularity and military ability compelled them to place him in the most responsible position. In a short time after the campaign opened, Görgei had defeated the Imperial armies and retaken all important places except Buda. Had he neglected the latter and pushed on to Vienna, which was unguarded, he might have closed the war in triumph, but he delayed to press the siege. Buda was taken by storm, May 21, but meantime the Russians had come into the contest. The disputes among the Republican leaders waxed fiercer as their enemies crowded upon them from all sides. On July 12 the Austrians were again masters of Buda. Görgei had fallen back beyond the Theiss, yet he still showed brilliant generalship in his manœuvres against the Russians, but the other generals who had been striving to unite with him were unable to force their way. On Kossuth's resignation Görgei became civil and military dictator. Believing it useless to prolong the war, he surrendered his army of 23,000 men to the Russian general, Rüdiger, at Vilagos, on Aug. 13, 1849. The other generals were executed, but Görgei was carried captive to Klagenfurt, in Austria, where he lived in retirement until 1867, being employed as chemist in a morocco factory. As his defence against a charge of treachery, he wrote *Mein Leben und Wirken in Ungarn in den Jahren* 1848 *und* 1849 (1852), which has been translated into English. Having returned to Hungary in 1867, after it had received a constitutional government, he published anonymously in 1869 a political essay, *Hungary in* 1849 *and after* 1866. In 1872 he was appointed to a position on a railroad.

GORGES, Sir Ferdinando (d. 1647), lord proprietary of the province of Maine, was born at Ashton Phillips, Somersetshire, England. He took part in the conspiracy of Essex, and testified on his trial in 1601. He served in the navy against Spain, and after the peace in 1604 was appointed governor of Plymouth. Learning something about America from some Indian captives, he and his friends applied to the king for a charter to found colonies. In 1606 two companies, the London and the Plymouth, were incorporated, and between them was divided the territory for 50 miles inland, from 34° to 45° N. lat. The Plymouth company had the northern part called North Virginia, and Gorges sent out an exploring ship, which was captured by the Spaniards. In May, 1607, three ships were sent with 100 men, who began a settlement near the mouth of the Kennebec, but abandoned it in the next spring. In 1614 an attempt by Capt. John Smith was also unsuccessful, but Dr. Richard Vines, sent out in 1616, spent the winter near Saco Bay, and made a good impression on the natives. In 1620, by a new patent, Gorges and others obtained control of the territory from 40° to 48° N. lat., and from sea to sea. In 1622 the land was divided among the incorporators, Gorges and John Mason taking the district between the Kennebec and Merrimack, and calling it Laconia. A settlement was made at Piscataqua in 1623, and in the same year Capt. Robert Gorges, son of Sir Ferdinando, was appointed by the council for New England "general governor of the country." In 1629 Mason and Gorges divided their tract, the former calling his part New Hampshire and the latter his part New Somersetshire, from their respective counties in England. In 1635 the council of New England surrendered their charter to the king, and Gorges obtained a charter constituting him lord proprietary of the province of Maine, as his territory was now called. He divided it into the counties of Agamenticus and Saco, and these were further divided into hundreds and parishes. In 1637 the king commissioned Gorges as governor-general of New England, but the latter never went. In 1640 he sent his nephew, Thomas Gorges, as deputy-governor, who went first to Boston and afterwards to the settlement in Agamenticus, which was now chartered as the city of Gorgeana. Both uncle and nephew were staunch adherents to the Established Church, and, though they showed tolerance to the Puritans, were somewhat distrusted. Hence their settlements were excluded from the confederacy formed in 1643 by the four New England colonies. Sir Ferdinando died at an advanced age in 1647, and, as his territorial rights had been more a source of expense and vexation than of profit, his heirs paid no attention to the letters from the colonists, who now came under the jurisdiction of Massachusetts. In 1677 his grandson, Ferdinando (1629–1718), sold his rights as proprietary to Massachusetts for £1250. He also published *America Painted to the Life* (1659), giving a full account of his grandfather's attempts to settle New England.

GORTSCHAKOFF, Alexander Michailowitsch, Prince (1798–1883), a Russian statesman, was born July 16, 1798, of a family distinguished among the Russian nobility. He was educated at Tsarskoe-Selo and entered upon a diplomatic career. He accompanied Count Nesselrode to the congresses of Laybach and Verona. In 1824 he was secretary of legation at London, and afterwards held diplomatic positions at Florence, Vienna, and Stuttgard. While ambassador at the last named he negotiated the marriage of Princess Olga with Crown Prince Karl of Würtemberg. In 1850 he attended the German imperial diet at Frankfort, and there came into close relations with Prince Bismarck. In 1854 he was sent to Vienna as ambassador, and there guarded the interests of Russia so well during the Crimean war that in April, 1856, he was made minister of foreign affairs. He soon asserted strongly the principle of non-intervention, applying it especially to the case of Naples. He declared as the motto of his policy, "Russia does not sulk, she meditates." Yet in 1860 he favored the French expedition to Syria. In 1861 he showed sympathy with the U. S. government in the American civil war, and repressed the desire of the French emperor for a joint intervention of European powers. He also resented the diplomatic notes of France, England, and Austria with reference to Poland. During the war between France and Germany, Gortschakoff maintained a strict neutrality, but he seized the opportunity to declare that Russia was no longer bound by the treaty of 1856 so far as the navigation of the Black

Sea was concerned. In 1871 a conference of the great powers was held in London, in which the demands of Russia were acceded to. Gortschakoff now showed his favor for the ideas of Prince Bismarck, and by interviews between the emperors endeavored to promote cordial relations between Russia and Germany. In Asia he sought continually to extend the power and influence of Russia. His diplomatic skill was especially displayed in connection with the Turkish war of 1877. Russian agents had instigated the people of Bosnia and Herzegovina against Turkey, yet Germany and Austria were induced to keep quiet, while England was almost drawn into war with Turkey. Prince Gortschakoff took part both in the treaty of San Stefano, Feb. 6, 1878, and in the conference at Berlin, July 13, 1878, by which the treaty was somewhat modified to the disadvantage of Russia. Gortschakoff blamed Bismarck for giving favor to Austria, and though the emperors continued on friendly terms the chancellors had serious differences. Bismarck felt that Russian influence under the guise of Pan-Slavism was becoming too strong in the south-east of Europe, while Gortschakoff claimed some return for his friendly neutrality in the French-German war.

Meantime the internal troubles of Russia called for still higher statesmanship. The astute diplomatist, whose skill had so often advanced her interests at the expense of other nations, had no remedy for the disease which was preying on the vitals of the empire. Early in 1882 he retired from the ministry of foreign affairs, and he even withdrew from Russia to Baden-Baden, where he died, March 11, 1883.

GORTON, Samuel (*c.* 1600–1677), a New England sectary, was born at Gorton, England, about 1600. He was a clothier in London until 1636, when he went to Boston, and afterwards to Plymouth. Being fined and banished for preaching he settled at Aquidneck, again got into dispute with the authorities and was whipped. In 1641 he took refuge with Roger Williams at Providence and soon after bought lands at Pawtuxet, now Cranston. A dispute arose about property and the Massachusetts authorities were called to interfere, which they were ready to do, but Gorton's party, after a protest against the proposed action, abandoned their settlement in September, 1642, and removed to Shawomet, now Warwick, R. I., where they bought land of the sachem Miantonomo. But other claimants appeared and appealed for help to Boston, where the authorities had been offended by the previous protest and by Gorton's heresies, against which even Roger Williams cried out in strong terms. Capt. Cooke with forty soldiers marched to Shawomet, and brought back Gorton's party for trial. They were condemned and sentenced to be dispersed among the towns and kept at hard labor in irons. In the following March (1644) they were set free and ordered to leave the colony. They went to Rhode Island, but Gorton sought redress in England, and by the favor of the Earl of Warwick obtained an order that they should be allowed peaceable possession of their lands at Shawomet. Returning thither in 1648 he named the place Warwick. He held several civil offices and on Sundays preached to the colonists and Indians. He repudiated all outward forms in religion and mingled mysticism with all his views. He died at Warwick, R. I., in November or December, 1677. In vindication of his course he published *Simplicitie's Defence against Seven-headed Policy* (London, 1646; reprinted by the R. I. Historical Society). He also published *An Incorruptible Key composed of the CX Psalm* (1647), and other religious treatises, and left in MS. a commentary on part of the gospel of St. Matthew. Samuel, one of his sons, lived to the age of 94. His sect survived him about a century.

GOSCHEN, George Joachim, an English financier, was born at London, Aug. 10, 1831. He is of German origin, and was educated at Rugby and graduated from Oriel College, Oxford, in 1853. He entered upon a mercantile life, and in 1863 was elected to Parliament from the city of London. The movements for opening the universities to dissenters and for the abolition of religious tests enlisted his support. He was made vice-president of the Board of Trade in November, 1865, and chancellor of the duchy of Lancaster, Jan. 26, 1866, but held this position only until June, when the Russell ministry retired. When Mr. Gladstone became prime-minister in December, 1868, Mr. Goschen was made president of the Poor-Law Board. In March, 1871, he was appointed first lord of the admiralty and held this office until February, 1874. In 1876 the French and English holders of Egyptian bonds appointed Mr. Goschen and M. Joubert to proceed to Egypt on their behalf. The Khedive, after hearing their representations, accepted a plan for the reorganization of the debt and finances of that country, the agreement being signed Nov. 18, 1876. Mr. Goschen, having differed from his party on the question of county franchise, declined to become a candidate for Parliament in 1878. He has given much attention to financial subjects and has published several treatises, among which is *Theory of the Foreign Exchange* (5th ed., 1864). He has also published a *Life* of his grandfather, a noted German bookseller.

GOSNOLD, Bartholomew (d. 1607), an English voyager to America, joined Raleigh in his attempt to colonize Virginia. After the failure of the settlement at Roanoke, he commanded an expedition fitted out by the Earl of Southampton. Sailing from Falmouth, March 26, 1602, with twenty colonists, he steered directly across the Atlantic and reached Massachusetts May 14. He landed on Cape Cod, which he named; then sailing southward around the cape to the mouth of Buzzard's Bay he planted his colony on an island which he called Elizabeth, but which is now known by its Indian name, Cuttybunk. But, disheartened by the hostility of the Indians and disputes about the division of their profits, the colonists returned to England in a few weeks. They carried a cargo of sassafras roots, cedar, furs, and other goods. Gosnold then organized a company to colonize Virginia, led by Wingfield, Rev. Robert Hunt, and Capt. John Smith, and a charter was obtained April 10, 1606. He set sail Dec. 19, with three vessels and 105 adventurers, and after a tedious voyage was driven into Chesapeake Bay, April 26, 1607. He sailed up the James River about 50 miles, where the colonists founded Jamestown, though Gosnold objected to the site as unhealthy. He himself fell a victim to disease, dying Aug. 22, 1607.

GOSPELS. The Gospels and the Acts of the Apostles constitute the historical portion of the New Testament. The four Gospels give an account of the redemptive work of Christ as wrought in his earthly life, in his death, burial, and resurrection; the Acts presents the work of the Risen Lord in the birth, development, and establishment of the Christian church by the Holy Spirit. The Gospels give the history of redemption in its successive aspects and stages—aspects of the work of Christ and stages of the redemption in process. Each Gospel prepares the way for its successor, each telling afresh the story of the life, death, and resurrection, from its own point of view, each beginning at a higher level than the preceding. The Gospels are vitally related to one another, and the four constitute an organic whole.

See Vol. X. p. 702 Am. ed. (p. 789 Edin. ed.).

Matthew is the opening Book—the Genesis—of the New Covenant. The Old Testament closes with the Jewish nation looking for their long-promised King and Messiah, the Jews are the elect people, a kingdom of priests, a holy nation (Ex. xix. 5, 6). In the Christian age, the Jewish nation is discarded; a church exists—an *ecclesia*—whose character and principle of constitution were not revealed in the Old Testament (Rom. xvi. 25, 26; Eph. iii. 3, 5, 6; Col. i. 26, 27). This church is selected out of all nations; in it Jewish rites are abolished; a bond of union heretofore unknown is established, while every existing distinction disappears; in this body the Gentiles form much the larger portion. How has this change been effected? If the promises of God stand, and his gifts and calling are without repentance, how are these astounding facts to be explained and justified? The Gospel according to Matthew answers these questions; it relates the coming of Jesus to the Jews as their King, their rejection of him, his consequent rejection of them, and the prospective establishment of the church and its ordinances. At every step it refers to the Old Testament for the principles on which all this has been done. The Gospel according to Matthew conducts us from the position of the Old Testament to that of the New.

Accordingly, in matter, manner, and style, this Gospel manifests its intimate relationship to the Mosaic dispensation and to the Old Testament. The law is a revelation from God, more real and stable than the outward universe (v. 13); Jerusalem is the holy city (iv. 5); the city of the great king (v. 35); the Jewish temple is God's dwelling-place (xxiii. 21); the holy place (xxiv. 15); the temple of God (xxvi. 61); the temple and altar are sacred and sanctifying (xxiii. 17–21); the altar service furnishes illustrations of obedience to the divine requirements (v. 23, 24); the authority of those who occupy Moses' seat is asserted, and obedience to their official commands enjoined (xxiii. 1–3). The quotations from the Old Testament are numerous, but, with perhaps a single exception, they are not predictions of specific events, but enunciations of great principles. It addresses itself to those who accept the Jewish Scriptures as a revelation of the divine character and conduct. It presents Christ in his character and office as the Jewish King; his forerunner announces that the kingdom of heaven is at hand (iii. 2); Christ repeats this announcement (iv.17); the apostles are sent to declare the coming kingdom (x. 7); the Gospel which he preaches is the gospel of the kingdom (iv. 23); and his teaching is the word of the kingdom (xiii. 19). The parables in Matthew are all of the kingdom of heaven. Christ sits on the throne of his glory, and applying to himself the august title of The King, gathers before him all the nations and pronounces the sentences of eternity (xxv. 31–46). At his death nature owns his authority, the earth is shaken, the rocks are rent, the graves are opened, the dead are raised (xxvii. 51–53). But the nation rejects its Messiah and King. Perverting the whole purpose and intent of the Mosaic dispensation (xii. 7), refusing to fulfil the office to which they were appointed, they crucified him who was the embodiment of God's purposes for them as a people. At his birth he was doomed to death by the civil authority; as soon as his character was developed the religious guides pursued him with an animosity which would not be satisfied short of his crucifixion. From the beginning his fate is inevitable: "Foxes have holes and birds of the air have nests, but the Son of man hath not where to lay his head" (viii. 20). His life is a continual withdrawal from the Jewish rulers. He withdraws into Egypt (ii. 14); then into Galilee (ii. 22); his public ministry as here told begins with his withdrawal from Judea (iv. 12); the Pharisees follow him and hold a council against him how they may destroy him, but when Jesus knew it, he withdrew himself from thence (xii. 15); still pursued by the Sanhedrim, he withdraws into the borders of Tyre and Sidon (xv. 21); and this course continues until he goes to Jerusalem to die (xix. 1). On the cross, his only word is that desolate wail, "My God, my God, why hast thou forsaken me?" (xxvii. 46). No word of sympathy from any human voice is heard, the passers-by revile him, the chief priests with the elders and scribes mock him (xxvii. 39, 43); while the cry still rings in the air, "His blood be on us, and on our children" (xxvii. 25).

The result of all this is the rejection of the nation. The kingdom of God is taken from them and given to a nation bringing forth the fruits thereof (xxi. 43). Christ declares that the unclean spirit has returned to his former habitation, bringing with him seven other spirits more wicked than himself (xii. 45). All the parables spoken in public after chapter xiii. set forth the national sin and the impending destruction (xxi. 28–33; xxii. 2). The final miracle is the blasting of the fig-tree, the emblem of the nation (xxi. 19). The closing public discourse is an arraignment of the Jewish authorities: portraying their character and history, he bids them fill up the measure of their father's iniquity, and with the inquiry, "Ye serpents, ye generation of vipers, how can ye escape the damnation of hell?" (xxiii.33); pronounces their doom and departs forever from the temple (xxiv. 1). The rejection of the Jews and the acceptance of the Gentiles have not waited until this time for intimation. In the genealogy with which the Gospel begins are found the names of four Gentile women who by faith obtained a place in the royal line (i. 3, 5, 6). At the birth of Christ the Gentile magi recognize and honor him, while the rulers and religious guides of the nation pass him by without notice. Egypt furnishes the refuge which Judea refuses (ii. 14, 15). A Gentile centurion exhibits faith not found in Israel (viii. 10). A Canaanite draws from the Lord the exclamation, "O woman, great is thy faith" (xv. 28). The Roman Pilate cleanses his hands from the blood which the Jews take upon themselves (xxvii. 24); and Pilate's wife warns him to have nothing to do with that just man (xxvii. 19); while the Gentile guards around the cross express their conviction of the blamelessness of the sufferer (xxvii. 54).

To take the place of the nation which has so signally failed to recognize the purpose of its election, a new body is chosen to be God's peculiar people—a holy nation, a kingdom of priests (1 Pet. ii. 9). This body—the church—is founded on the divinely revealed knowledge of Christ (xvi. 17, 18). To it are given a new life, a new covenant, a new constitution, a new commandment, new discipline, new ordinances. It is charged with the duty of discipling all nations, "baptizing them into the name of the Father, and of the Son, and of the Holy Ghost" (xxviii. 19).

At this point the Gospel according to Mark commences. Whatever may be the date of its composition, there can be no question as to its place in the history. It follows logically the Gospel according to Matthew. In it the Christ begins his work. There is no place for kingly character and office here; no one styles him King until he stands before Pilate; even the evangelist does not call him Lord until after the ascension, nor do the disciples give him that title. Here there is no authoritative exposition of law, no adjudication before judgment thrones, no comparison of the doom of the rejecter of the Gospel with that of Sodom and Gomorrah, no mention of the fire with which the Messiah is to baptize. No assertion is there of one greater than the temple, greater than Solomon, greater than Jonah; no argument based on Christ's ownership, as in Matthew and Luke; no ascription of power, such as the centurion utters in both those Gospels. In the other evangelists Christ speaks of his glory, but not in Mark; here it is the glory of the Father (viii. 38), with power and great glory (xiii. 26).

This is "the beginning of the Gospel of the Son of God." It presents the first aspect of sonship and the first aspect and manifestation of redemption. In John the sonship of Christ is that of eternal relationship, in Luke it arises from his conception by the Holy Spirit (Luke i. 35), in Mark's Gospel it is the sonship of consecration, obedience, and service—the privilege and characteristic of all the redeemed. Both as the beginning of the Gospel and as the Gospel of the Son of God, Mark is the Gospel of man—of man in his present constitution and condition, of man irrespective of all distinctions. "The Sabbath was made for man and not man for the Sabbath" (ii. 27); "My house shall be called a house of prayer for all nations"

(xi. 17); the distinction between ceremonially clean and unclean food is abrogated: "This he said, making all food clean" (vii. 19); and here is uttered the truth that, "To love God with all the heart, and with all the understanding, and with all the soul, and with all the strength, and to love his neighbor as himself, is more than all burnt offerings and sacrifices" (xii. 32, 33). The transference from the Jewish position of Matthew to the stage of the world occupied by Mark is apparent throughout the Gospel; Jewish customs (vii. 3, 4), Jewish facts (xi. 13), Jewish words (iii. 17; v. 41; vii. 11, 34) are explained. In Matthew the freedom of the nation from its old besetting sin of idolatry is expressly recognized (xii. 43); no instance of any possession by an unclean spirit is recorded. In Mark the cure of the unclean demoniac is the first miracle (i. 23). In Matthew and Luke—Jewish Gospels—repentance is emphasized; in Mark belief and unbelief; "All things are possible to him that believeth" (ix. 23). Our Lord begins his ministry with "Repent ye and believe the gospel" (i. 15), and closes with "He that believeth and is baptized shall be saved" (xvi. 16).

This is the beginning of the Gospel. Called out of Egypt (Matthew ii. 15), the people of God enter here on the first stage of redemption, the journey through the wilderness, in the course of which the old leaven is eliminated and a new and better generation appears. The only parable peculiar to Mark gives the course of Christianity in this dispensation: "So is the kingdom of God, as if a man were to cast seed into the ground, and should sleep and rise night and day, and the seed should spring and grow up he knoweth not how" (iv. 26, 27). To the same purport are the only two miracles peculiar to Mark: the healing of the deaf and dumb (vii. 32–37), and of the blind man at Bethsaida (viii. 22–25). In both of them the person cured is taken aside from the multitude while the cure is wrought; in the second the cure is gradual, as "he took his elect people aside into the wilderness where he would first open their spiritual ears and speak unto them his law, opening their eyes gradually, for not all at once are the old errors and the old confessions put to flight; not all at once do they see clearly; for a while there are many remains of their old blindness which, for a season, still hinder their vision; they see men as trees walking." The same method of dealing finds expression in the statement peculiar to Mark that in the explanation of parables Christ spake the word unto them as they were able to hear it (iv. 33).

The first privilege and requirement of the child of God is service. "Israel is my son, my first-born; let my son go that he may serve me" (Ex. iv. 22) is the demand of God as he begins the redemption of his people. The first sacrifice in the Book of Leviticus is the offering of consecration (Lev. i.). In the New Testament the first duty of those redeemed by the mercies of God is to present their bodies a living sacrifice, holy and acceptable unto God (Rom. xii. 1). Our Lord learns obedience that he may become the author of eternal salvation to all that obey him (Heb. v. 9). His first step is to take on him the form of a servant (Phil. ii. 7). A body is prepared for him, and in that body he comes to do his Father's will (Heb. x. 5, 7). In Mark the bodily actions and gestures of Christ are specially named. This feature occasions what has often been noted as a peculiarity of this Gospel—the minute and vivid details everywhere found. It is not so often noticed that these details relate chiefly to Christ's person, appearance, manner, etc. Equal circumstantiality is found in John, but there the hours of the day and other circumstances connected with the events are recorded. The Gospels that follow Mark emphasize the impartation of the Spirit to Christ. In this Gospel his human emotions are mentioned—anger (iii. 5), compassion (i. 40), wonder (vi. 6), displeasure (x. 14). The effects on the multitude are of the same character. They are astonished (i. 22), amazed (i. 27, ii. 12), beyond measure astonished (vii. 37), greatly amazed (ix. 15), they marvel at him (xii. 17). Only once do we meet the statement, which so frequently occurs in Luke, they glorified God (ii. 12). The sacrifice is spiritual as well as bodily, burning with the unceasing fire of the Holy Ghost. The Spirit driveth him into the wilderness (i. 12); his friends say, "He is beside himself," and wish to put him under restraint (iii. 21); here only are James and John named "Sons of thunder" (iii. 17). The rapid transitions of the Gospel evince its vigor and movement.

In this Gospel Christ is the Son consecrated to his Father's service. This is the one relation and character of the Gospel. It gives no account of Christ's genealogy, birth, infancy, childhood. No sermons or addresses of any length are recorded, and only four parables. In the other Gospels much space is given to his discourses, to his kinsfolk and associates, to the results of his work. This Gospel is occupied with Christ. In Luke we are introduced to the home of his parents; here to his own home (ii. 1; iii. 19). Elsewhere he is the carpenter's son; here he is the carpenter (vi. 3). Not that he is without associates; his human nature is shown in the craving for companionship manifested in the continual notice of the presence of his friends. He ordained twelve that they should be with him (iii. 14). The names of his companions are given by Mark as by no other evangelist (i. 29; xiii. 3). The distinction between Mark and the other Gospels in this respect is that there the persons introduced are objects of interest, exemplifying some working of grace; here they are simply mentioned as being with him. He remains the sole object of attention. The accounts of the cure of the Syro-Phœnician's daughter (vii. 24–30) and of the anointing of Christ (xiv. 3–9) are only apparently inconsistent with this statement; for it is expressly said that the first is given as the reason why Jesus could not find the seclusion he sought, and the second is introduced, out of its chronological place, to account for the arrest of Christ during the feast, contrary to the intention of the chief priests and scribes. Christ's consecration to obedience and service remains the one subject of the Gospel. His place is the characteristic of this dispensation, the privilege and duty of all. Work succeeds work without interruption, until the Gospel closes as it began—"And they went forth and preached everywhere, the Lord working with them" (xvi. 20).

In the Gospel according to Luke we enter on another stage of redemption. We pass from the individual to consider his relations to others, together with the consequent duties and blessings. It is the priestly Gospel, the Gospel of intercession, of redemption, the social Gospel, the ethical Gospel. It opens with the priest in the sanctuary offering incense, the multitude standing without in prayer (i. 8–10); it closes with the disciples "in the temple continually praising and blessing God" (xxiv. 53). From the first word from heaven—"Fear not, Zacharias; thy prayer is heard" (i. 13)—through the parables of the friend rising at midnight (xi. 5–8,) of the importunate widow (xviii. 1–5), of the publican (xviii. 13, 14), to the prayer of the penitent robber (xxiii. 42, 43), instances of successful petition abound; while in all the important crises of our Lord's life his prayers are specially mentioned (iii. 21, vi. 12, ix. 28). The companion of successful prayer is praise, with which this Gospel resounds. The inspired songs of Mary (i. 46–55), of Zacharias, (i. 68–79), and of Simeon (ii. 29–32) are still the canticles of the church. At Christ's birth the chorus of the angels sweeps through the midnight sky (ii. 13, 14). The shepherds return, "glorifying and praising God" (ii. 20); the paralytic and all that behold the miracle "glorify God" (v. 25, 26); the blind man at Jericho, as soon as he received sight, glorified God, and "all the people, when they saw it, gave praise unto God" (xviii. 43). The

Gospel of relationship from its very nature must have a certain element of restriction. It cannot be—what this Gospel is frequently called—the universal Gospel. We look in vain in Luke for expressions of universality common to all the other evangelists. In Matthew we read, "Ye are the salt of the earth;" "Ye are the light of the world" (v. 13, 14); "The field is the world (xiii. 38);" "Come unto me all ye that labor and are heavy laden" (xi. 28); in Mark, "The Sabbath was made for man" (ii. 27); "My house shall be called a house of prayer for all nations" (xi. 17); in John, "The Lamb of God that taketh away the sin of the world" (i. 29); "God so loved the world that he gave his Son, that whosoever believeth in him should have eternal life" (iii. 16); "The bread which I will give is my flesh, which I will give for the life of the world" (vi. 51); "I, if I be lifted up from the earth, will draw all men unto me" (xii. 32); "I am the light of the world" (viii. 12); "Other sheep I have which are not of this fold" (x. 16); Jesus "should die not for that nation only, but also that he should gather together in one the children of God that are scattered abroad" (xi. 52). Luke is singularly devoid of all such ideas and expressions. The one or two (ii. 32; iii. 6), which at first sight might seem to be in conflict with this statement, will be found on examination to be consistent with it. Only at the close of the Gospel comes the command to preach repentance and remission of sins in his name among all nations (xxiv. 47). In Luke our Lord does not cross the boundary of the Holy Land: nor does any one from beyond its borders come to him for help or grace. No Syro-Phœnician woman, as in Matthew and Mark, daughter of an accursed race, cries to him for succor; no Greeks, as in John, say, "We would see Jesus;" no miracle of feeding the 4000 is here; no blessing comes except through Israel. In the only instance of a Gentile asking a favor from the Lord—that of the Roman centurion—it is expressly stated that the rulers of the Jews were sent to intercede for him with the plea, "He loveth our nation and hath built us a synagogue" (vii. 3–5). The miracles of the Old Testament cited by Christ exhibit the same principle. The widow of Sarepta, in her penury, first makes a cake for the prophet of Israel, and then she and her house eat many days. Naaman, the Syrian, is cured by the interposition of an Israelitish maid, by applying to the king and prophet of Israel, and by dipping seven times—Israel's sacred number—in Israel's sacred river (iv. 25–27). Relationship is often expressly stated as the reason for Christ's action —"Ought not this woman, being a daughter of Abraham, to be loosed from this bond on the Sabbath day?" (xiii. 16); salvation came to the house of Zaccheus because he was a son of Abraham (xix. 9). In chapter xv. it is the *restoration* of the sheep, the coin, and the son that is the ground of rejoicing. The sheep belonged to the flock from which it wandered, the coin was the woman's inheritance, the son was still a son when he took his journey into a far country. In the discussions on the Sabbath it is not, Which of you shall *see*, but, "Which of you shall *have* an ass or an ox fallen into a pit, and will not straightway pull him out on the Sabbath day?" (xiv. 5). "Doth not each of you on the Sabbath loose his ox or his ass from the stall, and lead him away to watering?" (xiii. 15). The widow pleads with the judge to restore what had been taken from her (xviii. 3).

To relationship belongs redemption. Here, first in the New Testament, do we meet the word, "He hath visited and wrought redemption for his people" (i. 68). Anna spake of him to all that looked for the redemption of Jerusalem (ii. 38); and in the sad dialogue after the crucifixion the disciples say, "We trusted it had been he who should have redeemed Israel" (xxiv. 21). The Redeemer, by Israel's law, must be the Kinsman, the Goel. In the genealogy given by Luke Christ is more than the son of Abraham and David, he is the Son of God (iii. 38). Hence appears in this Gospel the primal view of redemption—that presented in the first promise—the personal conflict for man—"He shall bruise thy head and thou shalt bruise his heel" (Gen. iii. 15). Zacharias sings, "We shall be saved from our enemies and from the hand of all that hate us" (i. 71). Christ's opening commission is, "He hath sent me to preach deliverance to the captives" (iv. 18). Here Satan—the arch-enemy of man —says, "All the power and the glory of the kingdoms of the world is delivered to me, and to whomsoever I will I give it" (iv. 6). The woman healed is one whom "Satan has bound these eighteen years" (xiii. 16). In the hour of Christ's joy he beheld "Satan as lightning fallen from heaven" (x. 18). Satan desires to have the disciples that "he may sift them as wheat" (xxii. 31). The whole people and the whole land must be redeemed; if there are any portions of the land under ban, or any outcast classes of people, they will be the objects of Christ's special notice and care. For this reason Samaria and Perea occupy a large space in this Gospel. The rightful position and character of the Samaritan are vindicated (x. 30, 37; xvii. 11, 19).*

The relation of woman to the religious leaders is intimated in John iv. 27. In Luke's Gospel woman is specially honored; before Christ's birth, during Christ's ministry (viii. 2; x. 38–42), at his crucifixion (xxiii. 27, 49, 55), after his resurrection (xxiv. 1, 12). The poor, the publican, the transgressors of the Mosaic law were religious and social outcasts. Christ emphasizes the love of the woman who was a sinner (vii. 36, 50); he places a beggar in Abraham's bosom (xvi. 20, 22); a publican's prayer in the temple is accepted (xviii. 11–14); a publican is declared to be a son of Abraham (xix. 1–10); a malefactor accompanies the Lord to paradise (xxiii. 43).

The Gospel of Luke is the social gospel. The social relations and intercourse of Christ have a place unknown to the other Evangelists. It abounds with instruction as to social duties. John the Baptist directs his disciples, "He that hath two coats let him impart to him that hath none, and he that hath food let him do likewise;" to the publican he says, "Exact no more than that which is appointed you;" and to the soldiers, "Do violence to no man, neither accuse any falsely, but be content with your wages" (iii. 10–14). The Sermon on the Plain is in strong contrast with the Sermon on the Mount reported by Matthew; it covers our social and relative duties, the use that should be made of earthly possessions. "When thou makest a dinner or supper call not thy friends, but call the poor, the maimed, the lame, the blind" (xiv. 12, 13). To the same purport is the parable of the good Samaritan (x. 30–37); that of the rich fool (xii. 16–21); that of the shrewd steward (xvi. 1–9); that of the rich man and Lazarus (xvi. 19–31); the result of the interview with Zaccheus, "Behold, Lord, the half of my goods I give to the poor, and if I have taken anything from any man by false accusation I restore him fourfold" (xix. 8).

This Gospel of Redemption is the gospel of success. In the prophecy quoted when John the Baptist appears Luke adds to the words cited by the other Evangelists: "Every valley shall be filled and every mountain and hill shall be brought low, the crooked shall be made straight and the rough way shall be made smooth, and all flesh shall see the salvation of God" (iii. 5, 6). At the call of the first two apostles to their work we have, what we do not find in Matthew or Mark, the wonderful draught of fishes, a prediction of their success in their new calling (v. 4–7). The seventy return again with joy, saying, "Even the devils are subject unto us through thy name" (x. 17), and the Gospel closes as it begins with thanksgiving and praise for what God has done (xxiv. 53).

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* Indeed Luke sometimes seems to apply the term Judea to the whole of Palestine. In chap. iv. 44 Westcott and Hort read, "He preached in the synagogues of Judea," and in vi. 17; vii. 17, Judea apparently includes all the Holy Land.

The Gospel of John is the final Gospel. The opening sentences glow with that ineffable Light which in the Holy of Holies overhung the Mercy Seat between the cherubim; we behold "his glory, the glory as of the only begotten of the Father full of grace and truth" (i. 14). John begins where the other evangelists end, with the rejection of Christ by the Jewish people: "He came unto his own and his own received him not" (i. 11). Throughout the Gospel the Jews and Jesus are arrayed against each other in uncompromising hostility. In the Synoptic Gospels all Christ's intercourse with his disciples until his last journey to Jerusalem is designed to answer the question, Who is the Son of Man (Matt. xvi. 15; Mark viii. 29; Luke ix. 20)? The nature and person of Christ as the Son of the living God having been revealed, he announces for the first time the method of redemption—by his death, burial, and resurrection (Matt. xvi. 21; Mark viii. 31; Luke ix. 22). But John's Gospel begins with the declaration of Christ's divine character and atoning work; in the first chapter he is the Lamb of God that taketh away the sin of the world (i. 29); on him the angels of God are ascending and descending (i. 51); he declares the character and secret actions of Nathanael (i. 47–50); he needs not that any should tell him of man, for he knows what is in man (ii. 25); he is the Son of Man who came down from heaven and is in heaven (iii. 13). The first miracle which John records is the marriage feast (ii. 11); the first public act the cleansing of the Temple (ii. 16); the first discourse the revelation of the heavenlies (iii. 12);—all pertaining to an order of things which comes only at the close of the other Gospels. In Christ's discourses to the Jews, in his prayer recorded in chapter xvii., in the account of the crucifixion, the point of view is that of a finished work. The death on the cross is not so much the process of dying as the results of death; it is not defeat, but victory. In the other Gospels, when Christ speaks to his disciples of his approaching decease, he emphasizes his humiliation and suffering, his delivery to the Gentiles (Matt. xvi. 21; xx. 18; Luke xviii. 32); here his death is voluntary; "No man taketh my life from me but I lay it down of myself" (x. 18); it inheres in the relation he has assumed, "I am the good shepherd, the good shepherd giveth his life for the sheep" (x. 11); it is the reason for his Father's special love, "Therefore doth my Father love me because I lay down my life that I may take it again" (x. 17, 18); and it results in universal appreciation, "And I, if I be lifted up from the earth, will draw all men unto me" (xii. 32). In this Gospel there is no account of the transfiguration with its Moses and Elias, the encouragement for the coming Calvary. There are here no apprehensions of the cross, no Gethsemane; no angels strengthening him. When the band of men and officers approach him in the garden to apprehend him, when he says, "I am he," they go backward and fall to the ground (xviii. 6). Throughout the whole scene of the crucifixion the same wonderful character is preserved He does not receive testimony from men; no company of women bewail and lament him; no Judas confesses, "I have betrayed the innocent blood;" no Pilate's wife says, "Have thou nothing to do with this just man;" no dying malefactor testifies, "This man has done nothing amiss;" no Roman centurion says, "Truly this man was the Son of God." And he who needed no help or sympathy or testimony from men or angels would have none from nature; in this Gospel we read nothing of rocks rending, or of the earth quaking, or of the darkness covering the land. From the cross is heard no prayer, no cry, "My God, my God, why hast thou forsaken me?" "Father, into thy hands I commend my Spirit." He speaks but three words—the first, as if on a quiet death-bed, provides for his mother; the second is a fulfilment of Scripture; the third is the shout of the conqueror.

The final Gospel is the personal Gospel. The Divine Persons, Father, Son, and Spirit, are presented in their order, each in his distinct sphere and each in his relation to the others. The personality of Christ, the personal character of the relations he sustains are everywhere emphasized. He speaks rather than acts (viii. 12). His fundamental assertion is, I am—I am the Life, the Truth, the Way, the Vine, the Door, the Shepherd, the Resurrection. Few miracles are recorded, and the discourses are occupied with the nature of God, the essential oneness of Christ with the Father, the mystical union of Christ with his people. In the person of Christ all things find their fulfilment; not only the predictions of the Old Testament but the Old Testament itself; the Shekinah and the tabernacle (i. 14); the temple (ii. 19–21); the ladder on which the angels of God ascend and descend (i. 51); the serpent in the wilderness (iii. 14); the manna (vi. 32); the paschal lamb (i. 20; xix. 36); in him all nature finds its fulfilment—life (i. 4); light (i. 9); water (iv. 10); bread (vi. 50); all offices and relationships—the vine (xv. 1); the door (x. 7); the shepherd (x. 14); the way (xiv. 6). The reason and vindication of all Christ's actions are found in himself. The eight miracles in this Gospel are, with a single exception (iv. 46–53), self-moved—wrought without any request from those to be benefited, and in that exception the cure transcends the faith of the petitioner. In the discussions on the Sabbath there is no argument, as in the Synoptics, from David or the temple, or the conduct of man: his one justification is, "My Father worketh until now, and I work" (v. 17). In the one thought of belief in Christ centre all the requirements of God (vi. 28, 29). A personal relation to a personal Being comprises all that is necessary for perfect conduct and character; this meets every possibility of the soul (i. 4); satisfies every desire (iv. 14); fills every capacity for time and eternity (vi. 35). The personality of the thought moulds the style of John; it shows itself in the avoidance of abstractions, in the absence of all reference to law as now in force, in the continual recurrence of the personal pronoun, in the precision and accuracy with which words are used, in the continual repetition of words which this precision requires, in the ever-recurring antitheses, in the scrupulous restriction of terms. Believers, *e. g.*, are the children of God; only Christ is the Son of God.

It is the universal Gospel, "All things were made by him and without him was not anything made that was made" (i. 2); he "lighteth every man that cometh into the world" (i. 9); he is "the Lamb of God which taketh away the sin of the world" (i. 29). "The hour is coming in which all that are in the graves shall hear his voice and shall come forth" (v. 28).

The final Gospel is the Gospel of the essential and eternal. There is here no Sermon on the Mount, with its explanation of law; no Sermon on the Plain, with its ethical directions. In the conversations with Nicodemus (iii. 1–21), and with the woman of Samaria (iv. 7–26), in the discussions and controversies with the Jews (chap. vi.–x.), in the farewell discourses with the disciples (chap. xiii.–xvi.), there is no mention of duties which are by their nature restricted to this life. Directions with regard to conduct found in all the other Gospels disappear; the heavenly, the spiritual, and eternal are the subject of discourse. The church is viewed in the same light. Christ institutes no ordinances, ordains no apostles, appoints no officers. He breathes on the disciples the Holy Spirit which is to be the eternal life of the church (xx. 22). The Gospel begins with the declaration of the intrinsic nature of Christ, with his relation on the one hand to the Uncreated and on the other to all that comes into being. The antagonisms are the ultimate and permanent—light and darkness, life and death. The relationships are not historic, but ideal (viii. 39). Times and places disappear; God is Spirit, and is worshipped in spirit and in truth (iv. 21–24); while Christ returns to the glory which he had with the Father before the world was (xvii. 5). (H. G. W.)

GOSSE, Edmund William, an English poet, was born at London, Sept. 21, 1849, being the son of the naturalist P. H. Gosse. He was educated in Devonshire and was made an assistant librarian at the British Museum in 1867. He gave much attention to the languages of Northern Europe and travelled in Sweden, Norway, Denmark, and Holland for the purpose of studying the manners and literature of those countries. He has published *Madrigals, Songs, and Sonnets* (1870); *On Viol and Flute* (1873); *King Erik*, a tragedy (1876); *The Unknown Lover*, a drama (1878); *From Shakespeare to Pope* (1884). He has written largely for periodicals on old English poetry, on Scandinavian and Dutch literature, and has translated several works into English. In 1884 he made a brief visit to the United States and lectured on English literature.

GOSSE, Philip Henry, an English naturalist, was born at Worcester, April 6, 1810. He removed at an early age to Poole, Dorsetshire, where he acquired a taste for natural history. He resided in Newfoundland from 1827 to 1835 in a mercantile capacity, and spent his leisure in collecting insects and making drawings of them. Three years in Lower Canada were spent in the same way. Afterwards travelling through the United States, he made further researches, and in Alabama gave especial attention to the butterflies. Returning to England, he published *The Canadian Naturalist* (1840). In 1844 he went to Jamaica and spent eighteen months, the results of which are seen in his *Birds of Jamaica* with an *Atlas of Illustrations*, and *A Naturalist's Sojourn in Jamaica.* He next wrote some text-books on zoölogy, and, being compelled by ill-health to resort to the sea-coast, he pursued investigations described in *A Naturalist's Rambles on the Devonshire Coast* (1853). He then gave an impulse to the erection of public and private aquariums for the better study of marine life. He took up his residence at Torquay that he might the better prepare his important work on *Actinologia Britannica, A History of the British Sea Anemones and Corals* (1860). Among his other works are *Romance of Natural History*, *A Year at the Shore*, and *Land and Sea.*

GOTTSCHALK, Louis Moreau (1829–1869), an American pianist and composer, was born at New Orleans, May 8, 1829. He was sent to Paris in 1841 for instruction in music, and made his first public appearance in April, 1845. After several professional tours in Europe he came to the United States in 1853, giving his first concert in New York, Feb. 11. After several very successful tours in American cities, he went, in 1857, to the West Indies, where he spent five years in careless enjoyment of tropical life. Recalled to New York in 1862, he resumed his professional work. Throughout his career his brilliant and effective rendering of his own compositions for the piano won the favor of the public. He composed about fifty pieces, most of which illustrate tropical life. Among them are *Le bananier*, *Marche de nuit*, *Bamboula*, *Chant de Soldat*, *Réponds moi*, *Pastorella e Cavaliere*, and many Cuban dances. He died suddenly near Rio Janeiro, Dec. 18, 1869. He published *Notes of a Pianist* (1865).

GOUGH, John Bartholomew (1817–1886), an American temperance orator, was born at Sandgate, Kent, England, Aug. 22, 1817. He came to America in 1829 and lived on a farm in Oneida co., N. Y., but in 1831 became a bookbinder's apprentice in New York city. Falling into dissipation he was frequently thrown out of work, and then, to obtain strong drink, sang comic songs in low taverns. He married in 1839, but sank deeper in intemperance and lost his wife and child. When reduced to great misery he was invited by a Quaker to take the temperance pledge, and soon after produced a sensation by telling his story at a public meeting. He became a prominent advocate of the temperance cause, but in 1842 some of his former companions led him to violate his pledge. He subsequently confessed his fault and endeavored to make amends. After ten years of great success as a temperance lecturer he went to England in 1853 and carried on a remarkable work there. But his character was assailed by Dr. F. R. Lees, also a temperance lecturer, and a suit for libel, brought by Mr. Gough, resulted in his complete vindication. He returned to the United States in August, 1860, and soon began to lecture on "Street Life in London." Other subjects were added to his list, and in all he retained his great popularity. In 1873 he announced that he would retire from the lecture field, but he was afterwards prevailed upon to appear on special occasions. In 1878 he again visited England. He died at Philadelphia, Feb. 18, 1886. In 1869 he issued his *Autobiography and Personal Recollections*, and in 1876 *Sunshine and Shadow*, being chiefly passages from his lectures.

GOULBURN, Edward Meyrick, an English clergyman, was born in 1818. He was educated at Eton and at Balliol College, Oxford, graduating in 1839, and was elected fellow of Merton College. He was ordained deacon in 1842 and priest in 1843, and became incumbent of Holywell, Oxford. In 1850 he was Bampton lecturer, and was chosen head-master of Rugby School. In 1858 he was appointed minister of Quebec Chapel and prebendary of St. Paul's Cathedral, London. In 1859 he was appointed one of the Queen's chaplains in ordinary and incumbent of St. John's, Paddington. In 1866 he was made dean of Norwich. Besides a large number of sermons and lectures, he has published *The Doctrine of the Resurrection of the Body* (1851); *The Idle Word* (1855); *Inspiration of the Holy Scriptures* (1857); *Personal Religion* (1862); *Pursuit of Holiness* (1869); *The Great Commission* (1872); *The Holy Catholic Church* (1873); *The Acts of the Deacons.* He is a high churchman, an earnest preacher, and a vigorous writer.

GOULD, Benjamin Apthorp, an American astronomer, was born at Boston, Mass., Sept. 27, 1824. His father, bearing the same name (1787–1859), was for many years the head-master of the Boston Latin High School, and edited school editions of the Latin classics. The son graduated at Harvard in 1844, and afterward studied mathematics and astronomy at Göttingen under Gauss, taking his degree in 1848. After visiting the chief observatories of Europe, he returned to Cambridge, Mass., in December, 1848. Here he founded the *Astronomical Journal*, devoted to original investigations, and edited it from 1849 to 1861. Being called into the service of the coast survey in 1851, Prof. Gould greatly improved the application of the telegraph to the determining of longitudes, and finally, on the laying of the Atlantic cable in 1866, connected the longitude measurements of America with those of Europe. In 1855 Dr. Gould was made director of the Dudley observatory at Albany, superintended the erection and equipment of the building, and introduced many improvements in the instruments and methods of observation and calculation. A controversy, which arose between the trustees of the observatory and the scientific council, who had been placed in charge of its management, terminated Dr. Gould's connection with it in January, 1859, leaving him involved in debt on its account. In 1863 he was placed in charge of the statistics collected by the U. S. Sanitary Commission during the war, and published an elaborate discussion of them. In 1868 he was appointed by the government of the Argentine Republic to organize and direct a national observatory at Cordova. The building was erected and equipped in 1870, and Dr. Gould, with four assistants, entered upon the work of mapping the southern heavens. He has published many astronomical papers and charts.

GOULD, John (1804–1881), an English ornithologist, was born at Lyme, Dorsetshire, Sept. 14, 1804. He began the study of natural history at an early age, and from 1818 to 1824 resided at the Royal Gardens, Windsor, studying birds and flowers. He then removed to London and was employed in preparing specimens for the museum of the London Zoölogical Society. Having obtained, in 1830, a fine collection from the hill countries of India, he published *A Century of Birds from the Himalaya Mountains*, with illustrations by his wife (1832). The success of this work induced him to undertake a larger one on *The Birds of Europe* (1832–37), and then, in 1838, to go to Australia, where he spent some years in collecting material for his *Birds of Australia* (7 vols., 1842–48); *The Mammals of Australia* (1845–59) soon followed, and in 1865 a *Supplement* was added to his work on the birds, and also a *Hand-book to the Birds of Australia.* He gave much attention to the humming birds, and collected more than 2000 specimens, illustrating 320 species. This collection was the basis of his *Monograph of the Trochilidæ* (1850). He published several other monographs, including one on the *Odontophorinæ, or Partridges of America* (1844–50). His other important works were *The Birds of Great Britain* (5 vols., 1862–73), and *The Birds of New Guinea* (1875). He died at London, Feb. 7, 1881.

GOUNOD, Charles François, a French composer, was born at Paris, June 17, 1818. He was educated at the Paris conservatory and enjoyed the instruction of Halévy and Lesueur. In 1839 he gained the prize which enabled him to go to Rome for further study. Here he devoted himself to old Italian church music, and his love for this branch of the art induced him to enter a priests' seminary. In 1843, returning to Paris, he became musical director at a church, and held this position for six years. Several works of church music were produced in this time, but after his *Messe Solonnelle* (1851), he gave his attention more to secular music, producing the lyric drama *Sappho* and several pastorals, yet for a time without marked results. But his *Faust* (1859) was the first successful opera on a theme which had been essayed by many composers. It captivated the French and even overcame the prejudice of the Germans, who objected to the modifications of Goethe's version of the tragedy. Gounod produced other operas, which did not attain the same popularity. Among these were *La Reine de Saba* (1862); *Mireille* (1864); *Romeo and Juliet* (1867). The war of 1870 drove him to London, but he returned to Paris in 1875. In London he produced the opera *Polyeucte* (1870), and a cantata, *Gallia* (1871). Since his return to Paris his chief works have been the opera *Le tribut de Zamora* (1881), and the oratorio *Redemption* (1882). He has been very successful in songs and minor works, in which he displays complete mastery of the form and elegance of execution. He has been elected a member of the French Institute.

See Vol. XI. p. 5 Am. ed. (p. 4 Edin. ed.).

GOURD. This name, while generally given to all members of the genus *Cucurbita*, is more particularly applied to *Lagenaria vulgaris*, a close relative of the *Cucurbitæ.* This is the well-known bottle-gourd or calabash, remarkable for the hard outer layer of its large fruit. It is a climbing annual, with a slender, branching stem, from 10 to 20 feet long, and climbing by aid of 3 to 4 cleft tendrils. The leaves are nearly circular, cordate pubescent, 4 to 8 inches long. The flowers are large and white with green nerves and veins, solitary, axillary, on long peduncles. The fruit is 12 to 18 inches long, unequally biventricose. It is, when mature, nearly hollow, the rind or shell becoming smooth, thin, and hard. The fruit takes different forms in cultivation, the most marked being the *pilgrim's gourd*, in the form of a bottle, the *long-necked gourd*, the *trumpet gourd*, and the *calabash*, large and without a neck. Some rarer varieties have a flattened, very small fruit, like the *snuff-box gourd.* Some of the cultivated varieties are said to become 6 feet long. The great gourd-like fruit, known in the West Indies as the *calabash*, comes from an evergreen tree (*Crescentia cujete*). The shells of this are used by the negroes for various purposes, while the sub-acid pulp is eaten. The flesh of the gourd is sometimes sweet and eatable, sometimes bitter and even purgative. The fruit, when ripe, is of a pale yellow color, changing to a pale bay when dried. Its shells are used for various domestic purposes. (C. M.)

Gourds.

GOURKO, Joseph Vladimirovitsch, Count, a Russian general, was born Nov. 15, 1828. He was trained in the imperial corps of pages at St. Petersburg, and became cornet of the Life-Guard Hussars in 1846. He was captain in the infantry in the Crimean war. In 1857 he returned to the Life-Guards, and became colonel in 1861, brigade-commander in 1873, and division-commander in 1876. At the outbreak of the war with Turkey, in 1877, he was placed in command of the Russian vanguard. After crossing the Danube at the end of June, he pushed on to Tirnova, and beyond the Balkans. But soon meeting the Turkish reserve forces, he was compelled to withdraw, and at the Shipka Pass he joined the Russian main body. In August he was recalled to St. Petersburg to organize a corps of cavalry, which he brought in October to aid in the investment of Plevna, where Osman Pacha was maintaining an unexpectedly gallant struggle. Gourko prevented reinforcements from reaching the besieged Turks, and thus compelled their surrender, Dec. 10. Then taking command of an army of 75,000 men, he crossed the Balkans in the depth of winter, captured Sophia Jan. 4, 1878, Philippopolis on the 16th, and reached Adrianople on the 20th. At the end of the war Gourko was made general of cavalry, and placed on the Czar's staff. In April, 1879, an attempt was made to assassinate the Czar, and Gourko was thereupon made governor-general of St. Petersburg, which was placed under martial law. Yet two further attempts followed, whereupon Gourko was removed from his position, deprived of his command, and banished to his estates. Alexander III. recalled him into active service, and in 1883 made him military governor of Warsaw.

See Vol. XI. p. 9 Am. ed. (p. 9 Edin. ed.).

GOVERNMENT. Civil society, government, and law are so closely related that one cannot exist without the other; for civil society is a society which has a government and is held together and regulated by law. Without government or without law there can be no civil society. When individuals enter into a voluntary association for hunting, fishing, or mutual sustenance or protection, it is not a civil society if any one of them may, at will, separate himself from the others, and observe or not observe the rules of the association. Civil society can only exist when the rules made for the conduct of its members are forcibly carried out. This can only be done when there is a general consent thereto, and a habitual respect for, and obedience of, those rules on the part of the general body of the members. Without this, all would be confusion and mutual strife.

Why it is that men willingly consent to remain together in civil society, subject to government and law, is a problem which has distressed many inquisitive minds in trying to solve it; and a great many solutions have been given. Some say it is the result of a social contract; some, that it is the desire of mutual security; some, that it is the result of an ordinance of God; and what not. We do not think it necessary to lay it all to any one cause. The fact itself is the most important thing. But if we wish a cause, we may be very well satisfied to believe that it is the nature of mankind to be disposed to society, to order, to government; and that this nature was impressed upon them by the author of their being, as he has impressed upon other orders of his creatures the instinct of herding and flocking and swarming and schooling together, on the land, in the air, and in the sea. At the same time we cannot fail to see that this natural disposition is directly consonant with the other causes that have been suggested; all which tend to cement and strengthen the social union. For perpetual consent and acquiescence is equivalent to a contract; and such perpetual consent and acquiescence are secured by the necessities of men growing out of the circumstances of their situation. They need each other's help in every way. They need rules to protect them in their lives, their liberties, and their property; and they need governors, rulers, magistrates, whatever name we choose to call them, to make and enforce these rules. It is a choice between the condition of savages on the one hand and the benefits of civilization on the other; and men are carried both by their natural instincts, their needs, and their aspirations to the advantages presented by the social state.

But, whatever the cause or causes, civil society, endowed with government and laws as necessary elements of its constitution, is a fact, and as such we are content to deal with it; premising that, as a matter of nomenclature, it is called in its concrete form the body politic, the state, the commonwealth, etc.

The world contains many civil societies of different grades of perfection and development, each independent of the other and constituting an autonomy by itself. Each separate society is a nation or people; and these, according to their respective positions in the scale, are civilized, barbarous, or savage. Amongst the latter the social principle is manifested in a crude and primitive state; it ascends through the other divisions in a gradually improved form until in the highest it reaches a most complicated and artificial refinement.

Each nation, each body politic, each civil society has an organization of its own, adopted or at least used by itself independently of other nations, and each consisting of a people subjected to a government and regulated by an organic and civil law.

Government represents the nation. As such representative it maintains intercourse with other nations, makes and enforces laws, administers justice, suppresses disorder and crime, and promotes the national prosperity by wise regulations and works of public benefit and utility. These are the normal functions of government; though, like all human agencies, they may be imperfectly, unskilfully, or unfaithfully performed.

Governments are of different forms, according to the national preference or to accidental causes in the national history, or to the use of force on the part of those who have obtained the power to govern. The simplest forms are monarchy, aristocracy, and democracy, administered respectively by a single governor or king, by a select few, or by the people themselves. But instances of these simple forms are rarely seen. Most governments are of a mixed character, partaking of two or more of the simple forms, or in which a representation of the people, in lieu of the people themselves, participate; or, they may be, and often are, constituted solely of such representations, different portions of which perform different functions, according to the organic law of the state. Finally, there are federal governments, which are a peculiar combination of all or any of these, and which being the kind of government which prevails in the United States deserves more particular consideration.

See Vol. IX. p. 55 Am. ed. (p. 61 Edin. ed.).

FEDERAL GOVERNMENT consists of a union of two or more States under a common government for national purposes, whilst they remain distinct and independent as to all other purposes. The objects generally sought by such a combination are greater national strength and the mutual convenience and benefit of their citizens in their intercourse with each other.

Of federal governments there are two distinct kinds. One is that in which several independent governments form an alliance or confederation for mutual offence and defence, and the establishment of regulations for their general good, each being represented in a general council which advises or directs for the common welfare within the prescribed limits. An executive head is from time to time appointed by general consent. The old states of Holland, constituting the first Dutch Republic, may be mentioned as an example of this kind of federal government. This, however, is simply a confederation of different governments from which any one may retire at pleasure, and is not, strictly speaking, a constitution or establishment of a new and distinct government. The second form of federal government is of the latter class, namely, a new and distinct government formed for the exercise of certain portions of the sovereign power in and out of two or more separate governments, whose several States become for this purpose united into a single state or commonwealth. The United States of America is of this class. Of all forms of government this is the most complicated in its organization, and requires an exact delimitation of general and local powers between the general and particular states, and a high degree of cultivation in political aptitudes on the part of the people who are the subjects of it. But it is singularly adapted to the needs and energies of an active and enlightened people occupying territories of great extent, since it secures to each portion a local government for its domestic purposes, familiar with its habits, and sympathizing with its wants; and to the united nation a common government sufficiently powerful for its protection against other nations, and clothed with authority to provide general regulations for the mutual good of the whole.

Mr. Edward A. Freeman, in his *History of Federal Government*, speaking of the ideal of such a government, says: "That ideal, in its highest and most elaborate development, is the most finished and the most artificial production of political ingenuity. It is hardly possible that federal government can attain its perfect form except in a highly refined age, and among a people whose political education has already stretched over many generations."

What he adds concerning the true character of a federal government is so germane to the subject in hand that we venture to quote a few more sentences. "Two requisites," says he, "seem necessary to constitute a federal government in this its most perfect form. On the one hand each of the members of the union must be wholly independent in those matters which concern each member only. On the other hand all must be subject to a common power in those matters which concern the whole body of members collectively. Thus each member will fix for itself the laws of its criminal jurisprudence, and even the details of its political constitution. And it will do this, not as a matter of privilege or concession from any higher power, but as a matter of absolute right, by virtue of its inherent powers as an independent commonwealth. But in all matters which concern the general body the sovereignty of the several members will cease. Each member is perfectly independent within its own sphere; but there is another sphere in which its independence, or rather its separate existence, vanishes. It is invested with every right of sovereignty in one class of subjects, but there is another class of subjects on which it is as incapable of separate political action as any province or city of a monarchy or of an indivisible republic. The making of peace and war, the sending and receiving of ambassadors, generally all that comes within the department of international law, will be reserved wholly to the central power. Indeed, the very existence of the several members of the union will be diplomatically unknown to foreign nations, which will never be called upon to deal with any power except the central government. A federal union, in short, will form one state in relation to other powers, but many states as regards its internal administration." (Vol. I., pp. 3, 4.)

The learned author evidently had the government of the United States in view when he portrayed this striking and just ideal of a federal government. Had he imagined it clothed with certain other powers of a general and national character besides those of international relations and personality—powers which will be more particularly specified hereafter—he would have drawn a very perfect outline sketch of the government of the United States and of the several States of which the United States are composed.

The plan of having one general government for the administration of the common affairs of a country or territory, and particular governments for managing the local and domestic concerns of small portions of that territory, is carried out in the United States with much benefit and success in the smaller divisions and subdivisions of the several States; not by establishing small independent sovereignties, but subordinate agencies of the State governments. For this purpose the States are divided into counties, the counties into towns (or townships as they are sometimes called), and, at intervals, cities and other municipal corporations. The legislature of the State (if it is not already done by its constitution) invests the local authorities of these subordinate divisions, who are generally elected by the people of their several districts, with such powers of deliberation, control, and management as are suitable to their limits and necessities, so as to enable the people of these districts, as far as possible, and without interfering with other like districts, to regulate their own domestic affairs. Thus, the counties take due care for the erection and repair of necessary bridges, houses for the poor, asylums for the insane, reformatories for delinquents, high-schools for advanced pupils, etc. The towns are charged with the repair of the common highways, the construction of the smaller class of bridges, the regulation of fences, pounds, and animals, the management of the common schools, and many other minor things that interest the farmers and villagers of the country. The limited legislation exercised in this way by counties is vested in county boards, either elected from the county at large or delegated by the towns. The legislative action of the towns themselves, the last civil division of the State, is usually conducted in the town meetings, consisting of those citizens of the town at large who choose to attend on the regular or special days fixed for that purpose.

The administration of justice in small matters of controversy is also deputed to local magistrates having county or township jurisdiction, who receive their appointment sometimes from the legislature and sometimes by election of the people. Thus, taking the whole country together, there is a regular gradation of jurisdictions and authority from the local town-meeting to the government of the United States. It is the common belief in our country that this diffusion of the powers of government and its limited participation by the people in their local assemblies is, for most purposes of social advancement, far superior to the centralism which prevails in some countries, where the supreme government intermeddles with the repair of every country road, the management of every parish and common school, and the appointment of all petty local officers and teachers.

This system of popular government by means of representatives, designated by the electoral assemblies of the citizens, involves the postulate that the majority has the right to rule; and this again is grounded on the more fundamental postulate that, in the matter of civil rights, all men are equal, and each one has a right to an equal voice in all that concerns the body politic. The truth of these supposed axioms we do not propose to discuss. It will be assumed. The argument belongs to the field of political philosophy, which has been fully occupied by the ablest thinkers, speakers, and writers. But the right of each citizen to an equal voice at the hustings, and the right of the majority to rule, must be exercised under such safeguards against fraud as the experience of popular elections demonstrates to be necessary. Without such safeguards, sanctioned by the stern rejection of fraudulent votes and fraudulent returns of votes, the system could not stand. Hence, a degraded people, sunk in corruption, are unfitted for the high duties of free government. It requires intelligence and manly virtue. Unless these permeate the mass sufficiently to give it character, despotism is sure to supervene in the end.

Government, it is proper to add, is not the same thing as sovereignty. By sovereignty is meant the ultimate power of the state, to which all final appeals are made. By government is meant the ordinary depositaries of the civil power. In the United States it is a received axiom that the sovereignty resides in the people at large. But the people are not the government. Neither the people of the United States, nor of any single State, can be brought together for consultation, decision, or the execution of measures. They can only meet by representation in what are commonly called "conventions." They never meet, even in convention, except on the extraordinary occasions of framing or amending the constitutional, or fundamental, law, by which the government is created and shaped, its different departments distinguished, their several functions assigned, their powers limited, and the mode of making future constitutional modifications prescribed. At the breaking out of the American Revolution the people of the several States, by their delegates, met in voluntary conventions (or congresses, as they were then called), and instituted State governments, which have continued to the present day, only modified, from time to time, slightly in details by conventions of the people assembled according to the organic law. In this way the great People of the United States, separately assembled in conventions in the several States, adopted and confirmed the Constitution of the United States, which had first been framed by a national convention of all the States. Thus this great document of national unity and government received the sanction of one of the most august sovereignties that ever stood upon the earth. Its opening words require no adventitious aid to invest them with the dignity due to a nation's utterance: "We, the People of the United States, in order to form a more perfect Union, establish Justice, insure domestic Tranquillity, provide for the common Defence, promote the general Welfare, and secure the blessings of Liberty to ourselves and our posterity, do ORDAIN AND ESTABLISH this CONSTITUTION for the United States of America." (See CONSTITUTION OF THE UNITED STATES in Vol. II.)

This instance is a striking illustration of the distinction between sovereignty and government. To the people of the United States, taken collectively, belongs the sovereignty of the United States; and to the people of each State, in like manner, belongs the sovereignty of that State; whilst the government of the United States and the government of each State are respectively those depositaries of power and authority which preside over, and give law to, the body politic submitted to their respective charge, being thereto elected or appointed, according to the methods prescribed by the respective constitutions.

In other countries this distinction between the sovereignty and the government is not always recognized. In them the sovereignty is often claimed to reside in the government itself. But if it be conceded that the form and structure of a government stand upon the national will or consent, it is difficult to avoid the conclusion that the nation, or people, and not the governmental agency, is really the sovereign power.

We sometimes hear of the *government of the people.* The government of the United States is sometimes so called. But this is only in a figurative sense. It is true, the influence of the people over the government is very great, and this arises from two causes: first, the frequency of elections, by which the persons who are placed in government positions are constantly called to account by the people for the manner in which they have discharged their duties; secondly, the constant influence of public opinion by means of the press. These two causes make the government of the United States, and those of the several States, indirectly governments of the people, but not directly so. It is so near the truth, however, that many inconveniences of a democratic form of government are experienced in the United States; those inconveniences, to wit, which flow from sudden and capricious changes of popular opinion, and from the wild emotions and excitements which designing or reckless demagogues are capable of arousing in the public mind.

The close dependence of the government upon the people under such a Constitution as that of the United States acquires signal importance, not free from peril, when the great conflicting forces of society, such as capital and labor, the rich and the poor, liberty and monopoly, come into active antagonism. Concentrated wealth can, in a thousand unseen ways, move the counsels and hands of those who ostensibly govern the nation; whilst the people, not so sagacious as to what will affect their interests, and not able readily to combine their strength, are overreached and betrayed. Such intrigues may prosper for a time; but, unless some seasonable remedy is applied, a day of reckoning will come at last, when, like an earth-born giant with a million hands, the popular mass will rise up and hurl ruin and desolation broadcast in the land. So, on the other hand, the artful fomenters of discontent may incite the operative classes to combinations deleterious to the interests of all, and, for a time, through the ambition of aspiring demagogues, induce a course of mischievous legislation; or the innate jealousy of the people against monopolies and aggregated wealth may operate to bring about a like result, to the serious injury of important public enterprises and great damage to the public.

To such influences, on account of its extreme sensitiveness to the popular will, are free governments occasionally exposed; and it requires not only the constant and sober counsels of the good and great men of the country, but the influences of sound instruction diffused among the masses to counteract them.

But though the evils referred to are, at times, the natural outgrowth of a popular system of government, they may be said to be exceptional, whilst it receives a constant support from certain conservative influences which greatly counterbalance these occasional drawbacks. The close dependence of the government upon the people has a tendency to hold the depositaries of political power to a rigid account, and to prevent the adoption of measures inimical to the public interests. In other words, popular government has its good side and its bad side; but the people of the United States are confidently of opinion that their system is much better calculated than any other to secure personal liberty, and to prevent the operations of government from being carried on for the benefit of the few at the expense of the many.

The close relation between the government and the people in the United States has more especial reference to the legislative and executive branches than to the judicial. The latter is generally one step further removed from popular influence, being mostly appointed or elected by the other departments, either for life or for a long period of time. This gives the judicial department greater independence and stability. But jealousy of this independence has, in several States, brought about a change in the mode of appointment of judges, and has made them elective by the people. This, as far as it goes, has a tendency to make the decisions of the courts, as well as the enactments of the legislature, reflect the popular will—a result to be deplored by right-thinking men.

The division of government into three departments, legislative, executive, and judicial, first emphasized by Montesquieu, has come to be an accepted principle of political philosophy and ethics. It has a foundation in the nature of things, and some faint traces of it are exhibited in the practice of almost all governments. Even the most despotic sovereign employs the services of a council to deliberate upon and prepare proper laws, decrees, or ukases, and appoints judges to attend to the ordinary administration of justice between his subjects. But it has been reserved to modern times and to the United States to exhibit a clear and distinct illustration of the principle. Even the English constitution, from which Montesquieu derived the suggestion, did not do it entirely. First, several of the States, immediately after the Declaration of Independence in 1776, adopted constitutions in which this principle, as well as that of dividing the legislative branch into two houses, was generally adopted. The colonial governments had been of similar form. The Constitution of the United States, however, carried out the principle with greatest distinctness. The first section of Art. I. declares that "All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives." The first section of Art. II. declares that "The executive power shall be vested in a President of the United States of America." The first section of Art. III. declares that "The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish." The legislators and president were to hold their offices for limited periods of two, four, and six years; the judges during good behavior; and it is declared that no person, holding any office under the United States, shall be a member of either House [of Congress] during his continuance in office.

The grounds for this threefold division of the departments of government, and the reasons in favor of it, are, that the several functions are essentially different, and that each can be more beneficially discharged for the public good when discharged by separate and independent functionaries specially chosen for their supposed qualifications and fitness for the position assigned them. The legislative department, composed of a large body of direct representatives of the people, and a smaller body of men experienced in public affairs, are most admirably suited to deliberate upon those interests of the body politic which require legislative action; whilst the judges, chosen for their legal acquirements, and sitting in a separate forum, for the calm discussion of questions of doubt and difficulty arising upon the interpretation and application of the laws and the conflicting interests of parties, are supposed capable of bestowing that grave deliberation and calm judgment which their office peculiarly requires; and, lastly, the executive chief of the government, guided by the laws enacted by the legislature, and the exposition they may have received from the judiciary, is enabled to devote himself to their execution and fulfilment, and to the performance of those public acts and duties which the dignity and interests of the commonwealth require to be done. Each department aids the others and acts as a check upon them. Together they work out a most conservative and beneficial result. Political liberty, social progress, material development, have never had such free scope under any other form of government as under this Anglo-American system.

In the United States constitution of government, as we have seen, the legislative department consists of two separate branches, the consent of each of which is necessary to the passage of a law. The Senate is appointed by the State governments, two senators from each State, and for a period of six years. The House of Representatives is elected by the people, one member from each district containing the requisite number of inhabitants, and for a period of two years. The President may veto any act; but if it afterwards receives the vote of two-thirds of each House it becomes a law. It needs only to state this arrangement to see how well calculated it is to prevent hasty and inconsiderate legislation. And after a law has been regularly passed, if any rights should be claimed under it in the courts, the question whether Congress had constitutional power to pass it is still open, and the Supreme Court is the final tribunal to pass upon that question. This operates as a standing barrier against unconstitutional encroachments on the part of Congress.

There is no longer any controversy that the true object of government is the promotion of the happiness of the people governed. The governing class are not made such for their own sakes, but for the advantage of the body politic, whose trustees and servants they are. As was said by the great reformer, Luther—no less statesman than reformer—"Authority was not instituted for its own ends, nor to make use of the persons subjected to it for the accomplishment of its own caprices and ill passions, but for the interests and advantage of the people." This is now a received axiom of politics. The only embarrassment arises in carrying it out in practice; for it often happens that measures greatly demanded by the general interest are injurious to individuals. The erection of public works requires the imposition of taxes; and the suppression of traffic in opium, or intoxicating drinks, or other kinds of merchandise, may work injury to those who have made investments in those articles, or in establishments for their production. In view of the general law that partial evil attends upon universal good, Bentham's method of solution was to pursue the greatest good of the greatest number. Such problems, when they arise, are peculiarly within the province of the legislative department to solve. The representatives in that department are intimately acquainted with the wants, the capabilities, and the resources of the people, with what will be for their benefit and what burdens they can bear.

It may be somewhat difficult to define the exact functions of government and the extent to which it may properly interfere in the development of the material resources and industries of the country and the education and morals of the people. It may attempt too much. It may go too far. It may interfere with the free and unrestrained action of the people themselves and indirectly repress their spontaneous energies and enterprise. This always acts as a retarding and benumbing influence upon social and industrial progress, and should be carefully avoided. But there are certain undertakings which, either from their public character or their magnitude, demand the agency of government. Of course the instrumentalities of government, such as its navy, its fortifications, munitions of war, public buildings, light-houses, sea-walls, and the like, will be erected solely by and under the control of the government. Other works for public use, such as railroads, bridges, canals, turnpikes, etc., whilst requiring legislative authority, may be farmed out to private associations, subject always to the public use and to any regulations necessary to secure the people from imposition. The post-office and the mint are regarded in this country as properly under governmental management. Whether telegraphic communication should not also be so is a question for fair consideration. The business of public carriers would seem to be better conducted under private management. In this enumeration of offices and duties we do not distinguish between what belongs to national and what to State jurisdiction. As to the latter, however, we may add that the State legislatures, in matters within their jurisdiction, often descend to minute details. They not only authorize the erection of railroads, canals, turnpikes, and bridges, but they provide for the drainage of lands, authorize the erection of dams for mill-power, and create business, benevolent, educational, religious, and charitable corporations of every kind. In truth, there is hardly an end to the number of interests which they attempt to foster or in some manner to regulate. Legislative interference in private enterprises generally has a tendency to confer exclusive or peculiar privileges on somebody, and the extent to which it has been carried in many States has given so much dissatisfaction that amendments have been made to their constitutions to limit the legislative power. Thus the creation of private corporations has been carried to such an excess in some States that their legislatures have been restrained from creating any private corporations at all, being restricted to the passage of general laws under which private associations might organize themselves into bodies corporate, subject to such wholesome regulations as the interest of the public may require. Turning to one of these constitutional amendments—namely, to that made to the constitution of Illinois in 1870—we find the following provisions, to wit: "The State shall never pay, assume, or become responsible for the debts or liabilities of, or in any manner give, loan, or extend its credit to or in aid of any public or other corporation, association, or individual;" "the general assembly shall not pass local or special laws in any of the following enumerated cases: that is to say, for granting divorces, changing the names of persons or places, laying out, opening, altering, or working roads or highways, vacating roads, town-plats, etc., regulating county and township affairs, . . . granting to any corporation, association, or individual any special or exclusive privilege, immunity, or franchise whatever," etc. . . . "No corporation shall be created by special laws, or its charter extended, changed, or amended, except those for charitable, educational, penal, or reformatory purposes." Instead of special laws for effecting these purposes the legislature is restricted to the passage of general laws on the several subjects enumerated.

The necessity of these restraints upon legislative interference arises from the extreme nearness of the State legislative bodies to the people whom they represent, and the facility with which every petty grievance, want, or wish can be brought to their attention for redress or gratification.

In fine, in popular governments, like those which prevail in the United States, the danger is not that there will be too little legislation but that there will be too much. In one of the States (not a large one, either) the amount of legislation became so great a few years since that the annual volumes of laws grew to the size of nearly 2000 octavo pages; but the adoption of an amendment to the State constitution, limiting the power of the legislature in regard to private laws, has reduced the annual volumes to 400 or 500 pages—still too large by half.

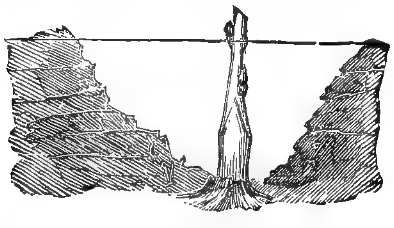
The truth is, Legislation with us is done to death. We can say, in the words of a great statesman, "The world is governed too much." Every new and raw member who can spell his name is seized with an itch to propose a bill. Our laws might well say, as the merchants of France said to Colbert, the great minister of finance under Louis XIV., when he asked what he could do for them, "Let us alone!" Our own conclusion is that the government of the country (considering the national and State governments as a unit) will best perform its duty and best subserve the public good if, after sufficiently protecting its citizens against the withering influence of foreign competition, it leaves them at liberty to pursue their private fortunes in their own way, under the stimulus of those motives which are ever active when the arts of peace are left untrammelled and the rewards of enterprise and honorable ambition are fairly open to all. (J. P. B.)

GRACE. Grace, in theology, is the favor of God to man, which to man as a sinner takes the form of mercy. The *doctrines of grace* are those doctrines which teach the manner and circumstances of the divine favor, as, *e. g.*, the doctrines of the total depravity of man, the incarnation, the atonement, the gift of the spirit, regeneration, sanctification, and glorification.

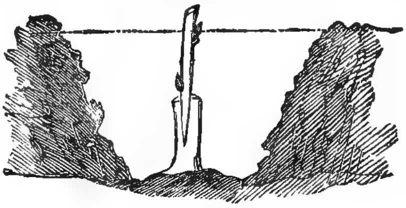
The word "grace" is also used for that condition which man possesses through the divine favor. He is in a condition of grace, as contrasted with the condition of nature. "Growth in grace" is thus progress in the divine life.

Some distinguish between *general* and *special* grace, the former represented by the light of nature and conscience, and the latter by the Word and Spirit. The holy principles of the soul in a state of grace, such as faith, hope, love, joy, peace, etc., are called "graces." (H. CR.)

GRAFTING. This process is employed in the propagation of trees, vines, and plants, also in securing early fruiting of new varieties by grafting upon bearing trees and vines, or numerous varieties upon one tree to test the comparative value. Nurserymen secure stocks of the apple, pear, plum, and cherry by sowing seeds in the early spring, or the fall previous. When these seedlings have reached the size of a lead-pencil or larger, which usually occurs in one or two years, they are dug and packed in a cellar. During the leisure of winter the roots, which are often from eight to fifteen inches long, are cut into pieces three to four inches long, and grafted with such varieties as are desired. The process usually employed on such stocks is called whip-grafting, which consists of a slanting cut on the root, a similar one on the scion, with a slit in both root and scion, which enables the parts to fit closely together, and to be held firmly in that position. The grafted root is immediately wound with cotton-yarn that has been drawn through grafting-wax, composed of equal parts of rosin and tallow, and one-fourth part of beeswax. This winding with waxed string is principally intended to hold the parts closely together, and is not intended to prevent the access of air to the parts. In former times it was deemed necessary to envelop the joint between the root and the scion with waxed cloth or paper, to exclude the air, as well as to hold the parts in place, but this method has been discarded, as it is not so expeditious. These grafted roots are placed in layers of moist saw-dust or sand until ready for planting, at the earliest possible moment in the spring, in the nursery rows. *Saddle-grafting* is sometimes employed in grafting roots. It consists in paring the roots in form of a wedge, and by making a saddle-like cleft in the scion, which enables the scion to fit closely over the wedge-like root in the form of a saddle. It is then wound with waxed cotton-yarn as before. In olden times people used wet clay in place of waxed string to protect the graft. *Cleft-grafting* consists in making a deep cleft in the stock or branch. It is held open by a wedge in the centre, while the scion is inserted at one edge, or, in case the stock is large, at both edges of the stock; after which the wound in the stock, and all parts of the scion cut with a knife, are covered with grafting-wax or waxed cloth, so as to exclude moisture or drying influences. If the tops of the scions are covered with wax, it renders success more certain, but is not necessary. Cleft-grafting is usually employed in grafting bearing trees, or where large limbs are grafted. More than one hundred methods of grafting have been practised, but the foregoing methods are principally used at the present date. Twenty methods of grafting were known in the days of the elder Pliny.



Saddle-Grafting.



Cleft-Grafting.

Success depends, 1, upon the scions being healthy, fully matured, and full of sap, and of the past season's growth only. Scions are usually cut in the fall, before they have been exposed to the action of severe freezing, which reduces their vitality. As soon as they are cut, they are placed in moist sand in a cellar, and nearly covered with that material until wanted. Where the winters are mild, it is best not to remove the scions from the trees until wanted, unless for very late grafting. In such cases the scions should be inserted before the buds begin to swell in the spring. 2. Only sharp knives and tools should be used, as the parts should be made to fit closely as possible, with the smooth cut of a sharp instrument only. 3. An inner layer of bark, on both scion and stock, should meet or cross at some point, in order to permit the continuous flow of sap from the stock to the scion. 4. The pressure of the stock upon the scion should not be too severe, as it may be in case of cleft-grafting. A strong pressure upon the scion, caused by the removal of the wedge, often holds the scion in too close an embrace. This is avoided by leaving a small wedge between the scion and the stock to bear a portion of the pressure. 5. In planting grafted roots, great care should be taken to have them planted as deep as possible, permitting one bud only to remain above the surface. Compact the soil as firmly as possible about them. In out-door grafting of large stocks, success depends largely upon the season when the work is done, which varies with different species. The plum and cherry require very early grafting. Such work is usually done at the earliest possible moment, often while there are yet traces of snow upon the fields, and before the buds of trees make any growth. The apple and pear may be grafted much later. It has been thought that the best time for grafting the pear or apple is when the leaves are beginning to push forward into growth, providing the scions have been kept retarded in a cool cellar. In no case should the buds of the scion have begun to unfold when grafted.

In nurseries where the buds or grafts have failed the previous season, they are often regrafted in early spring by whip-grafting, the juncture in such cases being protected by waxed cloth or paper. In all cases where the graft is fully exposed to the atmosphere, such protection is necessary, and is only omitted in case of root-grafts, which being buried in the soil, and the soil compacted firmly, are protected by the earth from exposure to the atmosphere. The graft does not take readily upon the peach, therefore the peach is seldom propagated in that manner. Grafts of the pear will grow upon the apple, quince, and thorn, and the plum upon the peach. There are many stocks upon which nearly allied species will thrive for a season, but as connection between different families is usually not permanent nor successful in the end, it is not necessary to go into the details here. The pear grafted upon the apple thrives only for a few years, often giving, however, fine specimens of fruit. The pear upon the quince is one of the most successful of all unions of the kind, forming the dwarf-pear, which is largely cultivated throughout the country with success. Dwarf-trees of the apple, cherry, etc., are secured by grafting upon a slow-growing stock. Thus, dwarf-apples are secured by grafting ordinary varieties upon paradise stock, etc.

Much attention has recently been given to the grafting of the grape, but until lately failure has been so frequently met with as to discourage the vineyardist, and yet, it is exceedingly desirable to make use of strong-growing varieties as stocks for those that grow more feebly. Many of the devices used in grafting the apple and pear have been applied to grafting the grape. It has been found that grafting-wax applied to grape-vines causes failure on account of the rapid escape of the sap from the vine in the spring. There has recently been invented the "Wagner saw," which introduces a new method of grafting the grape that has proved remarkably successful. This saw is composed of two thin blades, placed within one-eighth of an inch of each other, with a sharp chisel-blade between. The earth is removed from the old vine, often as far as the root will permit, exposing the collar. The vine is then cut off with the saw three or four inches below the surface. Cuts are then made in the stub of the vine remaining, cornerwise through the bark and half an inch into the stump, often three or four such clefts being made. Scions of the grape containing from one to three buds, the scions being from four to eight inches long, are inserted. The cuttings should originally be larger than the cut made by the saw, and the length of the cutting is no objection, as it can extend far below the juncture of the cutting with the stock. Our practice has been to pare the cutting on each side near the lower end a little wedge-shaped as usual, and press into the little gap made by the saw, but not too firmly. Often three or more of these cuttings are thus inserted in the root of the old vine. The lower ends of the cuttings extend intact into the soil below the incision made in the stock. The earth is then pressed firmly about the cutting and the stock, leaving only one eye exposed. This is the best method of grafting the grape known.

The effect of the stock upon the scion and the scion upon the stock is worthy of note, and has not received special attention until recently. The effect of the stock upon the scion is plainly shown in the grape. If we graft the Delaware, which is a very slow grower, with small berries, and leaves liable to drop, upon a Concord, which is a vigorous grower, producing large berries, and holding its leaves well, we will thereby secure a more vigorous Delaware vine, inclined to produce larger berries, more of them, and inclined to hold its leaves longer. Those varieties of grapes that are hardly worthy of cultivation upon their own roots, on account of lack of vigor and other constitutional defects, often succeed admirably when grafted upon more vigorous stocks. Where phylloxera has devastated a vineyard, it has been found necessary to graft the desired varieties upon the roots of those varieties that are not affected by the destructive root-insect.

The effect of the scion upon the stock is shown in cases where different varieties in the same nursery are grafted upon seedlings that possess common characteristics. Thus, Fameuse and Red Astrachan apple-scions are grafted upon common seedlings and planted side by side in the nursery row. On digging these trees, after they have grown in the nursery three or four years, it will be discovered that the Fameuse apple-trees have roots characteristic of the Fameuse variety, extending deep into the subsoil with coarse pronged roots, while the Red Astrachan trees will be found to have fibrous roots, branched near the surface as is common with that variety, notwithstanding that the roots of both varieties were originally the same. The effect of the scion upon the stock is further noticed in cases where vigorous pears are grafted upon pear-stocks in the same row in which feeble-growing pears are grafted. After a few years it will be discovered that the pear-roots grafted to the vigorous varieties are nearly double the size of those grafted of feeble varieties, and both the roots were of the same size when first grafted.

The propagation of fruit-trees is now more largely secured by budding than by grafting. When budding is practised the seedlings of the apple, pear, cherry, peach, nectarine, apricot, etc., are planted in the nursery rows, and allowed to grow there, with the best culture, until July, August, or September, when they are budded. Thus new varieties can be propagated much more rapidly from buds than scions, as one scion has several buds, each of which forms a tree when budded. The pear is usually grafted the earliest in the nursery, as it is liable to blight later in the season, which prevents further work. The plum follows next. In fact, the pear and plum cannot be budded much too early, as ripe buds for insertion cannot be secured earlier than July, unless purchased from points farther south, where the buds mature earlier, which method is beginning to be practised with pear-buds. Next come the cherry and apple, and lastly the peach, which is budded last. It has been found that early budding is usually most successful. Budding is accomplished by making a perpendicular slit just above the surface of the soil in a thrifty-growing stock, not smaller than an ordinary lead-pencil. Directly above this slit a cross-cut is made, then the bark is raised at this juncture. The bud is then cut from the scion of the present season's growth, with an inch of bark attached, and a little of the wood directly under the bud, in order to secure all parts of the bud, a portion of the bud often penetrating the wood slightly. This small bit of wood attached to the bud was formerly removed, but is now permitted to remain by most budders. The bud is inserted into the cleft of the bark, and pressed firmly beneath to its full length, after which the wound and bud are bound tightly with a string, usually bass-wood bark, permitting only a point of the bud to be exposed. At the expiration of two weeks the string is removed. If previous to this time the stock is discovered to be slightly cut by the string, it should be loosened before the expiration of the two weeks. The next spring the stock is cut off above the bud, and the bud only permitted to grow, which forms a tree, all other buds growing upon the stock being removed.

(C. A. G.)

GRAHAM, Sylvester (1794–1851), an American vegetarian, was born at Suffield, Conn., in 1794. In early life, being feeble and sickly, he was unable to pursue any employment steadily. In 1823 he entered Amherst College to prepare for the ministry, and was noted there for the fervor of his elocution. In 1826 he married, and soon after was licensed as a Presbyterian preacher. Being employed by the Pennsylvania Temperance Society to lecture, he began to study physiology, and then adopted the views which he afterwards advocated. These were set forth in his *Essay on Cholera* (1832), and more fully in the *Graham Lectures on the Science of Human Life* (1839). In his treatise on *Bread and Bread-Making*, he urged the use of unbolted flour for making bread, and this "Graham" flour and bread have been much used since by dyspeptics. Graham died at Northampton, Mass., Sept. 11, 1851.

GRAHAM, William Alexander (1804–1875), an American statesman, was born in Lincoln co., N. C., Sept. 5, 1804. He became a lawyer, and in 1833 was elected to the assembly of his native State. He was several times chosen speaker of that body, and in 1841 was elected to the U. S. Senate. He was governor of the State from 1845 to 1849. Pres. Fillmore appointed him secretary of the navy, which office he resigned when he was nominated by the National Whig Convention for Vice-President in June, 1852. The Whig party was defeated in the next election, and Mr.

Graham remained in private life until 1864, when he was a senator in the Confederate Congress. In 1866 he was a delegate to the Union Convention in Philadelphia. He died suddenly at Saratoga, N. Y., Aug. 11, 1875.

GRAHAME, JAMES (1790–1842), a Scotch historian, was born in Glasgow, Dec. 21, 1790. He was educated partly at St. John's College, Cambridge, studied law, and was admitted as an advocate at the Scottish bar in 1812. After practising his profession for some years he removed in 1826 to the south of England for the sake of his health. Here he devoted himself to preparing a *History of the United States*, of which two volumes appeared in 1827. The strong love of American ideas and institutions manifested in it seems to have hindered its success. The author, still in pursuit of health, removed to Nantes, France, where he collected materials for continuing his history, which, however, remains incomplete. Graham also published a *Defence of the Scottish Presbyterians* against Sir Walter Scott. Among his other pamphlets was one on the question of American slavery. He died in London, July 3, 1842. His *History* was republished at Philadelphia in 1846, with a memoir by Josiah Quincy.

GRAMONT, ANTOINE AGÉNOR ALFRED, DUC DE (1819–1880), a French statesman, was born at Paris, Aug. 14, 1819. He was educated at the École Polytechnique. Napoleon III. sent him as minister plenipotentiary to Cassel (1852), Stuttgart (1852), and to Turin (1853), where he assisted in bringing Sardinia into the Anglo-French alliance against Russia. In 1857 he was ambassador to Rome, but after the French recognition of the kingdom of Italy in 1861 he was sent to Vienna. In May, 1870, he was minister of foreign affairs in the Ollivier cabinet. Prince Leopold of Hohenzollern having voluntarily withdrawn his candidacy for the Spanish throne, Gramont insisted that King William of Prussia should declare formally that he would authorize no prince of his house to accept that throne. When the king refused and dismissed the ambassador, Gramont declared in the French Chambers on July 15 that war had begun. The speedy defeat of the army led to the downfall of the Ollivier ministry within a month. Henceforth the duke was the object of fierce attacks by various parties, and in January, 1872, he was summoned before a committee of inquiry into the causes of the disasters of 1870. He afterwards defended his action in various articles in the *Revue des Deux Mondes* and other periodicals. He published also *La France et la Prusse avant la guerre* (1872). He died at Paris, Jan. 18, 1880.

GRAND RAPIDS, a city of Michigan, county-seat of Kent county, is on both banks of the Grand River, 40 miles from where it empties into Lake Michigan and 153 miles W. N. W. of Detroit. Here the river is approached on either side by steep bluffs, and across the river extend the rapids which give name to the town. The river falls 18 feet in one mile. These rapids furnish an excellent motive power, largely utilized in milling and manufacturing, though steam is now used in most of the factories. Here centre several railways, the Chicago and West Michigan, the Grand Rapids and Indiana, one line of the Michigan Central, the Detroit, Grand Haven, and Milwaukee, the Grand Rapids, Newaygo, and Lake Shore, and a branch of the Michigan Southern. Canals for water-power extend along either side of the river, here crossed by six bridges. Above the rapids the river is again navigable for 50 miles. The manufactures include furniture, wagons, wooden wares, machinery, lumber, calcined and land plaster (from gypsum quarried near by), barrels, leather, beer, chemicals, and pale bricks, with a variety of other goods. Grand Rapids is the seat of the U. S. courts for Western Michigan. There are 3 hotels, 4 national banks, 2 other banks, 6 daily and 20 weekly newspapers (1 Dutch, 1 German), a copious water-supply, a system of street railways, good public schools, a city library, and a scientific institution with valuable collections. The police and fire departments are well organized. There are 46 churches, and the city is the see of the P. E. bishop of Western Michigan. It was settled in 1835 from New York and New England, and was incorporated in 1850, when its population was only 2686. In 1870 it had increased to 16,507, and in 1880 to 32,016. It is now estimated to exceed 50,000, making it the second city in the State in population.

GRANGER, GIDEON (1767–1822), an American statesman, was born at Suffield, Conn., July 19, 1767. He graduated at Yale College in 1787, and was admitted to the bar in 1788. He soon acquired a high reputation, and from 1793 was for several years a member of the State legislature. He was noted for his efforts to establish the State school-fund. In 1801 he was appointed postmaster-general of the United States and continued in this office throughout President Jefferson's administration, and under Madison until 1814, when his opposition to the policy of the latter required his removal. He then settled at Canandaigua, N. Y., and he was State senator from 1819 to 1821, and advocated the building of the Erie Canal and other internal improvements. He died at Canandaigua, N. Y., Dec. 31, 1822. His son, FRANCIS GRANGER (1792–1868), was also a prominent lawyer and was postmaster-general in 1841.

GRANGER, GORDON (1821–1876), an American general, was born at Canandaigua, N. Y., in 1821. He graduated at West Point in 1845 and served in the Mexican war, distinguishing himself at Contreras, Churubusco, and Chapultepec. He was afterwards employed on frontier duty. He was made captain in the Third cavalry May 5, 1861, and served on the staff of Gen. Sturgis in Missouri. He was appointed colonel of the Second Michigan cavalry Sept. 2, 1861, and brigadier-general of volunteers March 26, 1862. He served under Generals Halleck and Grant in the movement to open the Mississippi. In September, 1862, he was promoted to be major-general and commanded in Kentucky and Tennessee, repulsing Van Dorn at Franklin. He was distinguished at the battle of Chickamauga and was afterwards in command of the Fourth army corps at Missionary Ridge. He was engaged in the siege and capture of Mobile, April 12, 1865. After the war he held commands in Texas and Kentucky. He was appointed colonel of the Twenty-fifth infantry in 1866, and transferred to the Fifteenth in 1870, which command he held till his death, Jan. 10, 1876.

GRANGERS. The important association of American agriculturists, commonly known by this name, though formerly called Patrons of Husbandry, originated at the city of Washington, in 1867, through the action of several government employés. In January 1866, Mr. O. H. Kelly, a clerk in the agricultural department, was sent on a journey through the South in the interests of the department. Finding that agriculture in that section was greatly depressed and disorganized, in consequence of the war, it seemed to him that organization was necessary there, and reasoning taught him that it might prove as useful to Northern as to Southern farmers. His object was to establish a secret society in the interests of farmers alone. In this he interested William Saunders, J. R. Thompson, and William M. Ireland, all in the government service. These, with three other persons afterwards associated, devised the scheme, framed the constitution, and composed the ritual of the order, and organized its first society at Washington on Dec. 4, 1867, under the title of the "National Grange of the Patrons of Husbandry." Under the scheme of the order it was to be divided into national, State, and subordinate assemblies, or *granges*, the officers being entitled *master*, *overseer*, *lecturer*, *steward*, *assistant steward*, *chaplain*, etc. Women were to be admitted to membership on equal standing with men, and offices were provided for them under the titles of *Ceres*, *Pomona*, *Flora*, and *lady assistant stewardess*. The ritual embraced four successive degrees for men under the titles of *laborer*, *cultivator*, *harvester*, and *husbandman*, and four for women, entitled *maid*, *shepherdess*, *gleaner*, and *matron*. As to the purposes of the order they were two, the industrial benefit and the social improvement of its members. The discussion of any political question was strictly forbidden. Its work in these directions is part of the history of the order, which may be briefly given.

After the formation of the national grange Mr. Kelly resigned his clerkship and enthusiastically entered upon the task of establishing the order throughout the country. His success was not encouraging. Up to the close of 1871 there were but about 200 granges organized, while the national grange contained only its seven original members. From this time forward its progress was rapid. The farming population began to perceive the advantages of the association and grew as enthusiastic as they had been lethargic. In 1872 there were organized 1160 granges; in 1873, 8669; and in 1874 and 1875 about 11,000 in each year. At the close of 1875 there were about 30,000 granges in existence, said to average about 40 members each, the order being strongest in the West and North-west and well represented in the South. By this time its climax of prosperity had been reached. In the succeeding years jealousy arose between the subordinate and the national granges, and parties with no interest in agriculture beyond that of fleecing the farmers made their way into the order. So far was this carried that one grange was organized on Broadway, New York city, with 45 members, representing a capital of perhaps as many millions, and composed of bank presidents, wholesale dealers, sewing-machine manufacturers, and speculators. Other instances of a similar character might be named. The result of all this was a great depression of the order, from which it is but fairly beginning to recover. It may be said here that one main reason of this partial failure was the lack of discipline in the order, owing to its very rapid progress, and the misconception of many of the members as to its objects and their own true interests. Its more recent revival has been mainly due to an improvement in organization and to a higher realization of their true interests by the members of the order. As to its present standing it may be said that at the annual session of the national grange, held in Boston, November, 1885, representatives from the State granges of 34 States were present, they representing 24,000 subordinate granges. It is gradually increasing in number of members and of granges and has become generally spread throughout the country, the farmers everywhere beginning to appreciate the advantages of organization. Ten or twelve newspapers are published in its interest. A few years ago a deputy was sent to England, who established the order in that country. It has not yet made much progress there.

At the St. Louis session of the national grange, in 1874, the following "Declaration of Purposes" was issued:

"We shall endeavor to advance our cause by laboring to accomplish the following objects:

"To develop a better and higher manhood and womanhood among ourselves; to enhance the comforts and attractions of our homes and strengthen our attachments to our pursuits; to foster mutual understanding and co-operation; to maintain inviolate our laws and to emulate each other in labor to hasten the good time coming; to reduce our expenses, both individual and corporate; to buy less and produce more, in order to make our farms self-sustaining; to diversify our crops and crop no more than we can cultivate; to condense the weight of our exports, selling less in the bushel and more on hoof and in fleece, less in lint and more in warp and woof; to systematize our work and calculate intelligently on probabilities; to discountenance the credit system, the mortgage system, the fashion system, and every other system tending to profligacy and bankruptcy.

"We propose meeting together, talking together, working together, buying together, selling together, and, in general, acting together for our mutual protection and advancement, as occasion may require. We shall avoid litigation as much as possible by arbitration in the grange. We shall constantly strive to secure entire harmony, good-will, vital brotherhood among ourselves, and to make our order perpetual."

As to how these objects have been carried out we may briefly epitomize. For the social culture of its members music and literary exercises were introduced at the meetings, and the society has proved of great benefit in educating and entertaining, and in promoting social intercourse and study among the naturally isolated members of the rural community. Books were called for from all quarters, and much money has been invested in select libraries for granges in many of the States. The call for newspapers has been still greater, and one postmaster reports that where there was but one newspaper taken before the establishment of the grange in his vicinity there are now thirty. One clergyman writes: "Since the introduction of the *grange* I have seen a remarkable change in the walk and conversation of my flock; they are more careful in their dress and general appearance and are reading more."

Industrially the grange established agencies with manufacturers for the sale of their products directly to consumers, and at the greatest cash discount. As a consequence they succeeded in securing farming utensils, furniture, books, and all articles needed at a reduction of from 25 to 50 per cent. on former rates. The grange also attempted to institute a series of crop reports with very excellent results. But it was only tried in 1874, proving too expensive for the funds of the order. In addition an effort was made to introduce co-operation on the Rochdale system. But its progress was checked by the opposition of the previously established commission agencies. Yet co-operative stores were organized in many of the States, some of which are yet in profitable existence.

The war in the West against unjust discrimination in railroad freights, which produced restrictive laws in Illinois and Wisconsin in 1873, has been charged upon the granges, but falsely, as they declare. It was organized and sustained by agricultural clubs outside the order, whose constitution did not permit a participation in it, though the members were undoubtedly in strong sympathy with its objects. The result has been a partial removal of the unjust freight discrimination. The Eastern States are now moving actively in the same direction, and Pennsylvania and New York have organizations for this purpose, outside the grange. Other questions which the grange has taken in hand are such as the rapid increase of insects through undue destruction of insectivorous birds, the exposure of attempted swindles to which the isolation of the farmer renders him particularly liable, and of combinations to extort money for the use of articles falsely claimed to be patented, such as the *swing gate*, the *driven well*, etc. We may conclude in the words of Hon. D. Wyatt Aiken: "The harvest of improvement which the American farmers reaped during the prosperous era of the grange, and which is still ripening in every State of this Union, cannot be limited to a monetary valuation. The social elevation, the moral improvement, and the educational advancement have been beyond comprehension." (C. M.)

GRANITE, the name given to a class of igneous rocks, the oldest and most primitive in structure of the known rocks. The structure of the granites, however, seems to indicate that they are resultants of the disruption and reaggregation of still older rocks, since they are compounds of usually three and sometimes four or five constituents; namely, quartz, feldspar in two or three varieties, and mica in two varieties. These minerals are not cemented, but cohere so closely as to form the most compact of rocks, and one which is devoid of stratified structure. The constituents of granite occur often as minute crystals, seldom or never as rounded grains. These particles range from a size indistinguishable to the naked eye, to lumps larger than a walnut, in the so-called giant granites. Where large crystals of feldspar occur in the mass it is called porphyritic granite. Where the mica is replaced by hornblende the stone is called syenite. Granite is of a considerable variety of colors, from pure white, to gray, red, or deep black. Feldspar comprises from a third to a half or a greater proportion of the rock, while its principal chemical constituent is silica, of which it contains from 65 to 81.7 per cent. The feldspar is present in the form of orthoclase or oligoclase, or as albite in the white varieties. It is usually yellowish-white or reddish in color, more rarely gray or greenish, and gives the predominant color to the mass.

Granite gains its principal industrial value from its hardness, compactness, and homogeneous structure, it being uniform in all directions, of great strength and durability, and capable of yielding large blocks from its absence of stratification or parallel joints. These qualities render it suitable for locations where great resisting power is required, such as breakwaters, harbors, light-houses, docks, fortifications, and foundations. It is unsuited for fine sculpture on account of its structure and coarseness, and its resistance to the chisel. It, however, takes a fine polish, and is now much used for monumental purposes. It is subject to a slow decay, particularly in the colder climates, named by Dolomieu *maladie du granit*. This arises from the decomposing action of atmospheric water on feldspar, which is gradually dissolved, the insoluble silicate of alumina remaining as kaolin or clay, through which are mixed the sand grains and mica scales of the granite. If there be any iron present the clay will be red. In some cases this decay extends for many feet below the surface. In warm, dry climates granite may stand intact for thousands of years, as we have evidence in the syenitic obelisks of Egypt. In cold climates there is a gradual but very slow surface exfoliation. But there is a more dangerous weathering inward along lines of weakness, so that a deep disintegration may take place, and large fragments break off by the action of frost.

Commercial granite is not very extensively found in the United States. Its chief occurrence in the Eastern region is in Maine, New Hampshire, Massachusetts, Connecticut, New York, along the Great Lakes, and at points in the Mississippi Valley. It often has crevices or veins filled with foreign material, such as metallic ores and other minerals. The islands off the coast of Maine are chiefly composed of granite, and yield some excellent stone, which is largely used in the Atlantic cities. The red granite now so much used in this country for monuments comes chiefly from near Aberdeen, Scotland, but a similar stone is found in several localities in this country. Nova Scotia and New Brunswick yield a red monumental stone of fine quality, and a similar stone comes from the Red Beach quarries of Maine, which is largely used for polished monumental columns in all our principal cities. A light gray granite from quarries near East Bluehill, Me., has been much used in recent Philadelphia architecture, as in the City Hall and the Pennsylvania Railroad Bridge, as also in the East River Bridge, New York, and elsewhere. From this quarry blocks have been obtained of 90 by 80 by 6 feet dimensions.

Of the many other valuable New England quarries, those of Quincy, Mass., are best known, and the gray Quincy granite has been very largely employed in architectural work in the Eastern States. Granite is largely developed in some parts of the Rocky Mountains, where a red syenite equal to that of Aberdeen is found. Excellent gray and red stone occurs in many localities in the Laurentian area, back of Marquette, Lake Superior. The Sierra Nevada yields a gray granite, which is sometimes nearly white from the presence of albite. Many quarries are worked in California; those in the vicinity of Sacramento yielding blue, black, and gray granite, the black closely resembling the celebrated black granite of Egypt, and very beautiful when highly polished. It is used for monumental purposes. (C. M.)

GRANT. A species of conveyance at common law for transferring the property of incorporeal hereditaments and estates in reversion; it being impossible to give actual *seisin* or corporeal possession of that which had no tangible existence, or which the grantor had not in his possession; therefore such estates passed only by deed of grant. Livery of *seisin*, or delivery of possession, was necessary at common law to transfer an estate of freehold in corporeal hereditaments, and this although there was a written deed. Hence corporeal hereditaments were said to *lie in livery* and incorporeal hereditaments *in grant*. But by statutes 8 and 9 Victoria, c. 106, s. 2, all corporeal hereditaments shall, as regards the conveyance of the immediate freehold thereof, be deemed to lie *in grant* as well as *in livery*. In most of the United States, *livery of seisin* is dispensed with, either by statute or by usage, so that the word *grant* has become a generic term applicable to all transfers of real property.

The word *grant* is also applied to the disposition of personal property, and is distinguished from *gift* in that a grant is based on a consideration or equivalent.

GRANT, Sir Alexander (1826–1884), a Scotch educator, was born at Dalvey in 1826. He was the son of Sir Robert Innes Grant, and the eighth baronet of the line. He was educated at Harrow and Balliol College, Oxford, and in 1849 was elected a fellow of Oriel College. In 1855 he became an examiner for the Indian civil service, and a public examiner in classics at Oxford. In 1858 he was made inspector of schools in the Madras Presidency, and in 1860 professor of history and political economy in Elphinstone College at Madras, to the presidency of which he succeeded in 1862. In the next year he was made vice-chancellor of the University of Bombay, and in 1865 director of public instruction in Bombay Presidency. In 1868 he was called to be vice-chancellor and principal of the University of Edinburgh, and held this position at the celebration of the ter-centenary of that institution in 1883. While at Oxford he gave especial attention to the works of Aristotle and edited the *Nicomachean Ethics of Aristotle* with English notes (1854; 4th ed., 1882). He also prepared sketches of *Xenophon* (1871) and of *Aristotle*, and a *History of the University of Edinburgh* (2 vols., 1884), prepared in view of the ter-centenary celebration. Sir Alexander Grant died Nov. 30, 1884.

GRANT, Ulysses Simpson (1822–1885), the most distinguished American general, eighteenth President of the United States, was born at Point Pleasant, Clermont co., Ohio, April 27, 1822. His ancestry has been traced to Matthew Grant, who came from Dorsetshire, England, in 1630, and settled first at Dorchester, Mass., but afterwards at Windsor, Conn. The family continued to reside in Connecticut until the great westward emigration movement which followed the establishment of the new government of the United States. Then Noah Grant in 1790 removed to Western Pennsylvania, and later his son, Jesse Root Grant, went still farther west, settling on the north bank of the Ohio. He had married Hannah Simpson, and during the infancy of their oldest son, who was named Hiram Ulysses, they removed to Georgetown, Ohio. They were plain, honest, industrious people, belonging to the Methodist Episcopal Church. They both lived to see him President of the United States. Jesse was a tanner, but, finding Ulysses little inclined to follow that occupation, procured for him in 1839 from Thomas L. Hamer, the congressman in whose district he resided, an appointment to the U. S. Military Academy at West

Point. By some inadvertence the official document was made out in the name of "Ulysses Sidney Grant," and efforts to have the mistake rectified resulted only in altering the middle name to Simpson. Grant acquiesced in this, but he was generally called by his comrades "Uncle Sam Grant." Though a faithful worker, he was not brilliant nor specially distinguished in any study. When he graduated, June 30, 1843, he was No. 21 in a class of 39, and was made brevet second-lieutenant of infantry. He was assigned to the Fourth regiment, then stationed in Missouri, but in the next year sent to Louisiana, in anticipation of the annexation of Texas. In 1846 the war with Mexico commenced, and Grant, at first under Gen. Zachary Taylor, afterwards under Gen. Winfield Scott, took part in every battle except Buena Vista. At Molino del Rey he won by his gallantry the brevet of first-lieutenant, and later that of captain. Soon after his return from Mexico, on Aug. 22, 1848, Capt. Grant was married to Miss Julia Dent, of St. Louis, and with his wife he spent nearly four years in garrison at Sackett's Harbor and Detroit. In 1852, when he was ordered to the Pacific coast, she was unable to accompany him. After two years of tedious monotony in Oregon and California, Grant resigned his commission and returned to St. Louis, near which his father-in-law gave him a small farm and three negroes. But even hard work on the farm did not produce sufficient for his family, and he sought employment in the neighboring city. He found the business of a real estate agent precarious, and finally in 1860 removed to Galena, Ill., where his brothers took him as partner in the leather trade.

Before twelve months passed several Southern States had seceded, and the war for the Union opened for Grant a new career. Raising a company of volunteers at Galena he led it to Springfield, where his military experience led to his being employed in organizing the Illinois State troops. On June 16, 1861, he was assigned to the command of the Twenty-first regiment, which had become demoralized. Under its new commander, the regiment soon became noted for its thorough discipline and efficiency. In August, through the friendly offices of Elihu B. Washburne, member of Congress from the Galena district, Col. Grant was promoted to the rank of brigadier-general, to date from May 17, 1861. On Sept. 1, Major-Gen. J. C. Fremont placed him in command of South-eastern Missouri, with head-quarters at Cairo, Ill. Here Grant took John A. Rawlins, a Galena lawyer, as his adjutant-general, and afterwards retained him at the head of his staff throughout his military career. Before a week had passed Grant became aggressive, seized Paducah, Ky., and threatened Columbus. He was also energetic in organizing the regiments which were gathering at Cairo. In November he was ordered by Gen. Fremont to attack a Confederate camp at Belmont, Mo., opposite Columbus, Ky., which the Confederates, under Gen. Leonidas Polk, had now strongly fortified. Taking 3000 troops still imperfectly drilled, in river-steamboats imperfectly iron-clad, Grant sailed 20 miles down the Mississippi; his men clambered up the bank and captured the camp with a large number of prisoners. But meantime 4000 Confederate reinforcements arrived from Columbus, and Grant had to cut his way back through them to reach his transports. The Confederates claimed a victory here, but the substantial success rested with Grant. Gen. Henry W. Halleck having superseded Fremont as commander of the Department of Missouri, Grant spent the winter in drilling his troops while iron-clad gun-boats were constructed to force the passage of the Mississippi, now obstructed by Confederate fortifications. In February he received permission to carry out his plans for the capture of Fort Henry, which commanded the navigation of the Tennessee. The fort was captured Feb. 7, but the garrison escaped to Fort Donelson, which occupied a similar position on the Cumberland, 12 miles distant (see FORT DONELSON). Hastening thither Grant soon compelled its "unconditional surrender." Grant's capture of Fort Donelson on Feb. 16 was the first great success of the Union troops. It opened the way to Nashville, and compelled the evacuation of Columbus.

Pres. Lincoln for this important service promptly conferred on Grant the rank of major-general. Yet at this very time Halleck's displeasure with Grant became manifest, and the latter was for weeks without a command. When at last he was restored to his place, though not fully to the favor of his superiors, Grant prepared for an advance on Corinth, Miss., where the Confederate Gen. Albert Sidney Johnston had gathered a large army. As Gen. D. C. Buell was marching from Nashville to join Grant, Johnston determined to attack the latter before the Union troops could unite. On Sunday, April 6, he reached Grant's out-posts near Shiloh Church, surprised and drove the vanguard from their camp. From his head-quarters at Savannah, on the Tennessee, Grant, still lame from an accidental injury received a few days before, hastened to the fight at Pittsburg Landing, reformed his lines, and infused new vigor into officers and soldiers. The rapid onset of the Confederates was checked. During the afternoon their commander had been killed, and Gen. Beauregard, his successor, did not renew the assault. Gen. Buell's troops were beginning to reinforce Grant's army, and during the night in spite of a heavy rain they were posted. At daybreak the Union troops made a determined advance before which the Confederates gave way, seeking refuge in their intrenchments at Corinth. Again the nation gave due honor to Grant for victory, but Halleck found fault with him for permitting his troops to be surprised. At the time, and long after in his *Personal Memoirs*, Grant denied that there was a surprise, though participants on both sides have admitted it. Halleck now took the field in person, appearing to find it necessary to curb the too adventurous spirit of his subordinate. After a slow and excessively cautious advance for seven weeks, he captured the extensive but now deserted earthworks at CORINTH (*q. v.*), while the army which had been there intrenched escaped to render service elsewhere. In August Halleck, whose theoretic knowledge of strategy had given him high reputation, was summoned to Washington to take command of all the armies of the United States. The magnificent force which he had collected at Corinth was scattered in various directions, and Grant was left in command of the district of West Tennessee.

Grant had not overcome the prejudice which Halleck had formed against him. Yet his patient endurance of slight and his faithful performance of every duty assigned him were beginning to obtain their reward. For a time he was greatly tried by the influx of traders, spies, and camp-followers of all sorts into Northern Mississippi. To preserve the discipline of his army he made stringent regulations and kept his men steadily at work. In September he advanced from Corinth and on the 19th defeated Confederate Gen. Sterling Price at Iuka. Van Dorn's attempt to retake Corinth was also baffled. In November enough troops were gathered to commence the expedition against Vicksburg, "the Gibraltar of the Mississippi," then occupied by Gen. J. C. Pemberton. In the first attempt to capture this stronghold Gen. Sherman commanded the land forces and Commodore Porter the fleet of gun-boats. Entering the Yazoo for the purpose of attacking Vicksburg in the rear, they encountered formidable obstacles in bayous choked with trees and rafts. Sherman was defeated Dec. 28 in a desperate conflict at Chickasaw Bluffs just after a large collection of military stores at Holly Springs had been destroyed by the enemy. Towards the end of January Grant began to dig a canal across the neck of the peninsula which lies opposite Vicksburg. A sudden rise in the river destroyed his works and placed his army in great peril. With indomitable energy and unshaken confidence he persevered in his efforts to gain the Confederate stronghold. Passing below Vicksburg he crossed to the east bank and captured Port Gibson. When Gen. Joseph E. Johnston came from the east to assist Pemberton, Grant swung loose from the river and made a brilliant dash on Jackson, where he captured and destroyed military stores. He then returned and at Champion Hills, May 16, 1863, met and defeated Pemberton, who was now endeavoring to escape from the fate which threatened him if he remained. Pemberton was compelled to return and the siege of Vicksburg commenced on May 19. On both sides the resources of modern warfare were skilfully employed, but the coil of the besiegers steadily closed around the doomed city. Shot and shell fell in all parts, numerous mines were exploded, and the inhabitants began to suffer from famine. On July 3 Gen. Pemberton sent out a flag of truce asking for terms of capitulation, and on July 4 he surrendered his entire force, 31,600 men, with 172 cannon and thousands of small arms. On July 8 Port Hudson was likewise surrendered, and the navigation of the Mississippi was henceforth entirely open to the adherents of the Union, while the domain of the Confederacy was cut in two. Grant now received the rank of major-general in the regular army, and numerous testimonials were bestowed upon him by the grateful people of the loyal States. Again by dilatory orders of the authorities at Washington much of the fruit of victory was lost. In September General Grant was placed in command of the military division of the Mississippi, and at once hastened to the relief of Chattanooga, where Gen. Rosecrans was cooped up after his defeat at Chickamauga. (See CHATTANOOGA and CHICKAMAUGA.) Grant assigned the command of the town to Gen. Thomas, and soon completed his arrangements for its relief. The battles of Lookout Mountain and Missionary Ridge followed his arrival, and the Confederate Gen. Bragg, who had declared himself certain of capturing Chattanooga, was compelled to withdraw discomfited. The Union army, which under Gen. Burnside had been besieged in Knoxville, was relieved at the same time. In the following session of Congress the grade of lieutenant-general, which had previously been held only by Washington and Winfield Scott, was revived, and President Lincoln carried out the wish of the people in bestowing this rank on Ulysses S. Grant. His complete success in every great object aimed at in the West marked him as the man to accomplish the still more difficult task of overthrowing the military power of the Confederacy in the East.

Gen. Grant was therefore called to Washington in March, 1864, and on the 17th was placed in command of all the armies of the United States. Having arranged plans for their harmonious and simultaneous action in the ensuing campaign he left the details to the discretion of the respective commanders. He decided to move with the Army of the Potomac, while Major-Gen. Meade, the hero of Gettysburg, still retained its immediate command. On May 4 that army crossed the Rapidan and soon encountered the army of Gen. Lee, who had determined to fight at once. On May 5 began the bloody battle of the Wilderness, in which Grant steadily endeavored to outflank the right of the Confederates, but owing to their skill and stubborn bravery was unable to accomplish his purpose. On May 12 he wrote to Washington, "I propose to fight it out on this line, if it takes all summer." Yet he was gradually compelled to diverge from this line, and when at last his desperate assault along the whole line of the rebel fortifications at COLD HARBOR (*q. v.*) failed he transferred his army to the south side of the James. Want of promptness in his subordinates prevented the immediate seizure of Petersburg, and Gen. Lee divining his new object began to fortify that city. Again, when by prodigious labor a mine had been carried under the fortifications of Petersburg, a like want of promptness and co-operation prevented the explosion from being of service. Yet in spite of such minor failures Gen. Grant's plans for the overthrow of the rebellion were steadily approaching their consummation. Sherman was marching from Atlanta to the sea; the Confederate Gen. Hood, who had made a bold attempt to recall him by attacking Nashville, was repulsed by Gen. Thomas; Sheridan cleared the Shenandoah Valley of the enemy. On Christmas day, 1864, Gen. Sherman entered the city of Savannah, and in January and February, 1865, the Confederates were forced to abandon Charleston and Wilmington sea-ports, which, in spite of the strict blockade, had been of essential service to the Confederacy.

Operations around Richmond and Petersburg were renewed with vigor in February, 1865; Sheridan swept round the north side of Richmond, and after inflicting great damage approached Lynchburg, which he found too strong to be captured. In March he cut off the southern line of retreat from Richmond and won the decisive victory of Five Forks. On April 2 Gen. Longstreet at Petersburg pronounced its further defence impossible, and Lee began to evacuate Richmond, moving westward towards Lynchburg. All Grant's forces were thrown out in vigorous pursuit that the struggle might be brought to a speedy end. Worn out with hunger and the fatigue of incessant marching and fighting, the Confederate Army of Northern Virginia was becoming a mob of stragglers. Gen. Lee with his able lieutenants and brave soldiers had done everything that skill and courage could accomplish. But the end had now come. On April 7 Grant seeking to spare the further sacrifice of life asked Lee for his surrender, and on April 9, 1865, the terms were arranged at a memorable meeting between the two commanders at Appomattox Court-house. Gen. Grant's conduct on this important occasion and his generosity to the conquered foe received universal approval. The terms offered becoming known to the remaining Confederate generals were gladly accepted by all. The great civil war, which had lasted four years, and which had cost 350,000 lives and $4,000,000,000, was brought to a triumphant close. Liberty and union had prevailed over slavery and sectionalism. Yet within a week after the surrender at Appomattox the bitterness of spirit which characterized many adherents of the "lost cause" found expression in the assassination of Pres. Lincoln and the overthrow of the existing administration. But the government, established by the will of the people, and firmly grounded in its affection, survived the shock.

The last scene of the greatest American war was the review of the victorious Union army in Washington City, by Pres. Johnson and Gen. Grant, May 24 and 25, 1865. In his final report Grant summed up the splendid achievements of the various forces with generous criticism of his subordinate generals. Referring to the occasional jealousies of the East and the West he pronounced the verdict, "All have a proud record, and all sections can well congratulate themselves and each other for having done their full share in restoring the supremacy of law over every foot of territory belonging to the United States. Let them hope for perpetual peace and harmony with that enemy, whose manhood, however mistaken the cause, drew forth such Herculean deeds of valor."

As soon as the final victory had been won Grant set about a vigorous reduction of the numbers and expenses of the army. In the bestowal of rewards which accompanied the disbandment of the volunteer forces and the rehabilitation of the regular army, Congress established the rank of general of the United States army, and to this grade Grant was appointed July 25, 1866.

At this time Pres. Johnson was engaged in his unfortunate strife with Congress with regard to the reconstruction of the Southern States. Johnson's policy was baffled by the action of Edwin M. Stanton, who still held the position of secretary of war, to which he had been appointed by Pres. Lincoln. To prevent his removal Congress had passed a tenure-of-office law, but Johnson, while Congress was not in session, suspended Stanton and appointed Grant secretary *ad interim*. Grant while obeying the orders of the President as his superior carefully refrained from any violation of the letter or spirit of the laws already enacted by Congress. When that body reassembled the Senate refused to approve the removal of Stanton, and Gen. Grant at once relinquished the position. Pres. Johnson, who had used all his arts without avail to get the support of Grant for his policy, now charged Grant with breach of faith and endeavored to find means to humiliate him. But his plans failed ; Grant attended faithfully to his duties as general of the army, removing abuses and reducing expenses in that department, and refusing to intermeddle in political affairs.

Yet he could not prevent the minds of the people from turning to him when the time approached for the selection of a President of the nation which his valor had saved. In May, 1868, the Republican National Convention met in Chicago and unanimously nominated Gen. Grant as President. Schuyler Colfax was nominated for Vice-President after an animated contest. In the following November they were elected, receiving a popular vote of 3,015,071, while the rival candidates, Horatio Seymour and Frank P. Blair, Jr., received 2,709,613 votes. In the electoral college the vote stood 214 to 80. In his inaugural address, on March 4, 1869, Pres. Grant declared significantly, "I shall on all subjects have a policy to recommend, but none to enforce against the will of the people." His nominations for the members of his cabinet excited much surprise, as his intentions had been carefully concealed until after his entrance upon his new duties. Mr. E. B. Washburne, Gen. Grant's steadfast friend in the early days of the war, was made secretary of state, but a week later he gave way to Hamilton Fish, of New York, and went as U. S. minister to France. Gen. John A. Rawlins was made secretary of war ; Adolph E. Borie, secretary of the navy ; Gen. J. D. Cox, secretary of the interior ; John A. J. Creswell, postmaster-general, and E. R. Hoar, attorney-general. It had been the President's desire to appoint Alexander T. Stewart secretary of the treasury, but it was discovered that a law enacted at the formation of the government prohibited the appointment of an importer to that position, and, after an ineffectual attempt to secure the repeal of the law, George S. Boutwell was appointed to the position.

Pres. Grant soon made manifest the purpose of his administration to reduce as rapidly as possible the enormous debt incurred during the war, and to secure the resumption of specie payments. The heavy taxes necessary for this purpose were cheerfully borne by the people. During the eight years of Pres. Grant's administration, the public debt was reduced from $2,588,452,213 to $2,180,395,067, showing an average annual payment of over $51,000,000. While thus endeavoring to fulfil strictly all the financial obligations incurred during the war, Grant was not forgetful of what was due to the newly enfranchised colored people of the South. When the Fifteenth Amendment to the Constitution, which conferred on them the right of suffrage, was ratified by three-fourths of the States, in March, 1870, the President sent a special message to Congress, urging it to take all constitutional means to qualify them for their new duties. At a later date the organization in various parts of the South of bands of young men called Ku-Klux-Klan, for the intimidation and oppression of the negroes, obliged the President to call for congressional action. The Force Bill, signed April 21, 1871, enabled him to suppress the outrages to a considerable extent, though still oppression of the negro sheltered itself under State laws.

In the treatment of the Indians residing in the territory of the United States, Pres. Grant's administration showed a marked departure from the methods which had long prevailed. Seeing the need of change, and believing in the efficiency of missionary work, he called upon the prominent religious bodies of the country to take charge of various tribes, and recommended the renewal of the policy which William Penn had used with gratifying results in the settlement of Pennsylvania. This "Quaker" or "Peace policy" is still working for the good of both the red man and the white.

During his first term Pres. Grant brought before Congress the subject of civil service reform, which had already obtained a good degree of popular favor, though it was ridiculed and denounced by politicians of all parties. In 1871 Congress complied so far with his request as to authorize him to appoint an unpaid commission on this subject. The President continued to show favor to the movement throughout his term of office.

The most important event in the foreign relations of the government was the negotiation of the Treaty of Washington in 1870, by which the claims of the United States against Great Britain for infractions of neutrality during the civil war were to be submitted to an international board of arbitration. This board, consisting of distinguished representatives of England, the United States, Italy, Switzerland, and Brazil, met at Geneva in December, 1871, and in the following September gave its judgment, awarding to the United States damages to the amount of $15,500,000. The dispute in regard to the fisheries off the coast of British America was settled in like manner by a commission which met at Halifax, and awarded to the British government the sum of $5,000,000.

Less important, yet fruitful in consequences, were Grant's persistent efforts for the acquisition of San Domingo. In 1869 a treaty ceding this country to the United States failed in the Senate, through the opposition of Senator Sumner, but Pres. Grant continued to urge the project in various ways, though he never obtained congressional approval of his views. Between Pres. Grant and Senator Sumner there came a coldness, which was increased by some misunderstandings, until there was an open rupture. The senator by an intensely bitter speech in the Senate, just before the assembling of the Republican Convention, endeavored to prevent Grant's renomination, but the effort was in vain. Henry Wilson, Sumner's colleague in the Senate, received the nomination for Vice-President. Charles Francis Adams, who, as U. S. minister to England, had honorably maintained the cause of the United States during the critical period of the civil war, had been the original Presidential choice of those Republicans who were disaffected towards Grant ; but an attempt to give their movement a more popular character resulted in the nomination of Horace Greeley at Cincinnati, in May, 1872. The Democratic Convention afterwards indorsed this nomination, though some "straight-out" Democrats nominated Charles O'Conor. The Republican ticket was elected by 3,597,070 votes to 2,834,079 for Greeley, and about 35,000 votes for other candidates. Greeley, completely overcome by his defeat, died before the meeting of the electoral colleges in December, and among the mourners at his funeral was Pres. Grant. The electoral vote for Grant was 286 to 63 for other candidates, 17 votes not being counted.

During Gen. Grant's second term occurred a disastrous financial panic, precipitated by the failure of the firm of Jay Cooke & Co., who had been furnishing the means for the building of the Northern Pacific Railroad. The government used its powers under the laws to diminish the evils from which the country was suffering, but the President sternly resisted every measure tending to inflation of the currency. He therefore vetoed a bill passed by Congress which ordered the restoration to the currency of $46,000,000 of greenbacks which had been retired. In 1875, in accordance with his recommendations, Congress passed a bill for the resumption of specie payments on Jan. 1, 1879, and various steps were taken towards the accomplishment of this purpose, which was finally carried out.

In 1875 began what may be called the Centennial movement, in which the hundredth anniversary of each important event connected with the American Revolution was celebrated at the place of its occurrence. On April 19 Gen. Grant attended the celebration of the commencement of the conflict at Concord and Lexington. His next annual message to Congress referred in appropriate terms to the glorious career of the country, from insignificant beginnings to an era of universal freedom and prosperity, and pointed to the lessons of the past and the duties of the present time. The most important centennial celebration was that of the Declaration of Independence, made at Philadelphia, July 4, 1776. To show what the nation had achieved in the hundred years of its existence, it had been determined, with the sanction of Congress, to invite the nations of the world to an industrial exhibition at Philadelphia, from May 10 to Nov. 10. This exhibition, opened by the President at the appointed time, was in the highest degree successful, in spite of an unprecedentedly hot summer. The United States were thereby raised to a still higher place in the estimation of the world, while the American people were greatly benefited by the display of the skill and resources of other nations.

Towards the close of Pres. Grant's administration, the lower House of Congress having passed into the control of the Democratic party, numerous investigations of the management of departments of the government were ordered, and some of Grant's friends were proved to have been faithless to their trust. His own integrity remained untarnished, but his determination to "stick by his friends" gave his political foes opportunities for attacking his method of government. The conflict for the succession to the Presidency, when, according to a custom established by the example of Washington, he should retire at the end of his second term, caused unpleasantness in his cabinet and elsewhere. The Republican National Convention at Cincinnati, in May, 1876, nominated Gov. Rutherford B. Hayes, of Ohio. The Democratic Convention at St. Louis nominated Gov. Samuel J. Tilden, of New York. The contest was so close, and the result so involved in doubt, that Congress, feeling its inability to decide the momentous question, invoked the aid of an electoral commission of fifteen. This commission decided that Hayes had been legally elected President, and Congress accepted and ratified the decision. Pres. Grant, to whose firmness throughout this trying crisis the nation owes the preservation of peace, took the customary part in the inauguration ceremonies of his successor.

Grant's administration was one of the most important in the history of the country. The wounds of the civil war had not yet been healed. Indeed, the disastrous strife between his predecessor and Congress had rudely torn them open. The finances of the country had been in an unhealthy condition. Speculation had been stimulated by the prodigious development of the country, and the uncertain value of the medium of exchange. Political power was gravitating into the hands of leaders who had forfeited it for years by acts of madness without losing their hold on their followers. At such a critical time to guide wisely and safely the ship of state demanded intellectual and executive ability of the highest order. Grant's want of previous political experience may have led him into serious mistakes, yet these were no greater than had been committed by politicians noted for their astuteness and skill in state-craft. He profited by his own mistakes, being careful to avoid a repetition of them. His most vexatious blunder was his quarrel with Senator Sumner, with all its attendant difficulties; yet in this Grant was not chiefly to blame. The exposure of the Credit Mobilier frauds, though one of the most prominent events during his administration, chiefly affected the legislative department of the government. Pres. Grant deserved well of the republic for guarding its dignity in intercourse with foreign nations, preserving its peace at home, and fulfilling strictly all its obligations to every class of citizens and dependents.

When he retired to private life after sixteen years of unremitting and devoted labor in the military and civil service of his country, he determined to spend some time in foreign travel with his wife and some friends. Without deciding beforehand on the extent of his travels, he sailed from Philadelphia on May 17, 1877, on what became eventually a tour around the world. It has been described graphically by Hon. John Russell Young, an experienced journalist, who joined the general's party after it had reached Europe. The decision of Earl Beaconsfield that the ex-President should be received in England with the honors of a sovereign undoubtedly established a precedent which the rulers of other countries gladly followed. After a tour through England and Scotland Grant travelled over the continent of Europe, visited Egypt and the Holy Land, returned to Europe, and then started on a voyage to India, China, and Japan, in each of which countries he was magnificently entertained. Crossing the Pacific Ocean he reached San Francisco, Sept. 20, 1879, and was received with an ovation, which was repeated in several great cities. His tour closed in Philadelphia, the original point of departure, on Dec. 16, 1879.

At once leading members of the Republican party began to urge a third nomination to the Presidency of the distinguished citizen, whose merits had received world-wide recognition, and who, as they argued, was now still better fitted for the post. His claims were urgently pressed, but the power of the unwritten law, forbidding a third term, proved an insurmountable barrier. At the Republican National Convention, at Chicago, in June, 1880, his partisans maintained an unbroken front, but after a severe struggle a majority of votes was given to James A. Garfield, of Ohio, on the thirty-fourth ballot. Gen. Grant gave the nomination hearty support, and Garfield was elected in the following November.

Grant, on retiring from political life, made a visit to Cuba and Mexico. He then settled in New York city, where wealthy friends raised for him a fund of $250,000, the interest of which he was to have during life, while the principal he might dispose of by will. This was intended to offset his relinquishment of the position of general with its assured pension. Gen. Grant entering into business, became a partner in the firm of Grant & Ward, of which his son was already a member. The affairs of the firm were managed entirely by Ferdinand Ward, who had the reputation of being a successful man of business. Eventually it proved that he had engaged in reckless speculation, and while pretending to receive enormous profits had squandered all the money which he could induce his partners and friends to entrust to him. In May, 1884, the startling revelation came that the firm was bankrupt, and Gen. Grant, who had raised money for it on his personal security, was left almost penniless. He had received a severe fall on the ice during the previous winter which for several weeks confined him to his room, and afterwards for a time compelled him to use crutches. In June following a cancerous trouble made its appearance in the roof of his mouth, but little was done for it until October, when the general placed himself under the care of Drs. Fordyce Barker and J. H.

Douglas. The location of the cancer was such that no surgical operation could be performed, and it was evident that the disease was malignant and fatal. The general submitted patiently to the treatment prescribed, having already abandoned the use of cigars, to which in some measure his disease was attributable.

During the last year of his life Gen. Grant devoted considerable time to writing reminiscences of his career, beginning at first to write sketches of the war for the *Century Magazine*, and afterwards preparing an autobiography. His statements bear the impress of strict impartiality; he was careful to extenuate nothing, nor set down aught in malice. He tried to do ample justice both to those who served with and under him and to those who fought against him. A few errors that were pointed out in his magazine articles were corrected in his autobiography. His work breathes his earnest desire for the complete reconciliation of all who had been engaged in civil strife, and the full restoration of harmony between all parts of the country.

The misfortunes which had overtaken him led to the effort, during the closing days of the 48th Congress, to restore him to the U. S. army with rank of general on the retired list, which was accomplished on March 4, 1885. Grant's struggle with disease was prolonged for months. On the approach of summer he was removed to the cottage of Mr. J. W. Drexel at Mount McGregor, N. Y. Here his remaining days were passed with the attendance of his family, including his daughter, Mrs. Sartoris, who had come from England to wait upon him. He died on July 23, 1885. An impressive discourse was delivered by Rev. J. P. Newman, D. D., who had been pastor of the church which Gen. Grant attended in Washington, and had been called to his side during his last illness. Grant's body was taken to New York city, and, on Aug. 8, 1885, attended by a memorable military and civic procession, was conducted to its last resting-place in Riverside Park, which had been selected by his family.

Grant was of medium height, with a firm, expressive countenance, well covered by a brown beard. His constitution was remarkably strong, and though throughout the war he often shared the privations of the humblest soldier, he never succumbed to disease. His normal weight was about 160 pounds, but during his Presidency he became stouter. He retained robust health until the appearance of the fatal cancer.

Sprung from seven generations of ancestors born on American soil, Ulysses S. Grant, like Abraham Lincoln and James A. Garfield, is a typical representative of American training and American institutions. His character shows in strongly marked outline that modified Puritan type which prevails wherever New England settlers have formed settlements in the West. Strict integrity with love of freedom and disregard of conventionality are its personal traits. With these is combined a genuine patriotism, an ever-present regard for the welfare of the community and the state. When his country calls for his help, such a man devotes to her service his talents and energies and risks his life to establish and perpetuate her greatness. When the service is finished he retires without regret to the simple station of a private citizen.

Grant's fame will rest chiefly upon his military career. He was the greatest of American generals, not only as having successfully handled the largest armies which had ever been gathered on the Western Continent, but because at every stage of the war he achieved substantial success with the means at his disposal. This success was due to his clear and quick apprehension of the proper object to be aimed at, and the well-balanced judgment which enabled him so to dispose and utilize his resources as to accomplish that end. He learned quickly what his subordinates were able to effect, and more than once during the war of the rebellion he divined what his opponents would do from recollections of their character as displayed in the Mexican war. Though he consulted on proper occasions with his subordinates, he never allowed a council of war to override his own judgment. In the most critical period of the Vicksburg campaign he decided, in opposition to the views of every subordinate commander, to swing loose from the Mississippi, and by this movement, gallantly executed, he gained the desired end, not merely the capture of Vicksburg, but of Pemberton's army. Had he been undisturbed in his command after Fort Donelson, more than a year previous, he would not merely have captured Corinth promptly, but would have rent the Confederacy in twain by leading his victorious army to Mobile or against whatever armed force was gathered to obstruct his way. Armies, not earthworks, were his objective. There was no force then in the South-west which could have effectually resisted his determined attack.

Grant's plans even for great campaigns were simple. Having marked firmly the main outlines, he trusted much of the detail to the discretion of the subordinates who were to carry them out, and knowing his men as he did, he was seldom disappointed. Meantime he and his staff were spared the needless vexation arising from complicated orders, perhaps imperfectly understood. When the time came for action he did all that human might, directed by human skill, could do to accomplish his purpose. In the campaign of 1864, when he first confronted the greatest of the Southern generals, Grant's plans were frustrated rather by a variety of untoward accidents than by the skill of his opponent or the trained valor of the Confederate troops, great as both of these were. Lee was probably better fitted for the defensive than even Grant for the offensive, as was proved by the bloody battle of Cold Harbor, Grant's last attempt to find a weak spot in the guard of Richmond, and by the siege of Petersburg. It became therefore a question of the exhaustion of the resources of either party, and in such a struggle the South must succumb. To Grant was due the unrelaxing firmness with which the grip on Richmond was maintained, the steady narrowing of the field of conflict, and the speedy conclusion of the campaign of 1865.

Grant's vigorous, relentless prosecution of the war caused his character to be misunderstood, even by those who admired the results obtained. Grant was no lover of war; still more was he free from the merciless ambition of Cæsar or Napoleon. He was a sincere patriot, a firm believer in the principles of republican liberty. To these he was willing to sacrifice his wishes as for them he had often imperilled his life. Even when as President he seemed to insist too tenaciously on the carrying out of plans he had framed for his country's welfare, he was but fulfilling in a legitimate way the trust which had been imposed on him. When through want of the necessary co-operation of Congress or the people, his plan was found impracticable, he gave it up without hesitation and without complaint.

As in regard to action, so in regard to speech Grant was often misunderstood. The exigencies of the war had obliged him to be cautious in speaking, and even reticent; yet he was by no means taciturn. On the contrary he was well fitted and well disposed to take part in conversation among friends. But the straightforward simplicity of his nature prevented him from using his words to conceal his thoughts. He had never cultivated the American habit of public speaking, whether from want of opportunity or from positive distaste. Yet from his despatches and public utterances pregnant sentences found their way to become watchwords of public sentiment. The literary work which occupied many hours of the last year of his life bears on every page the impress of his love of truth, honor, and righteousness.

The greatness of Grant's nature is shown in his entire freedom from jealousy. In all his reports, as in his *Personal Memoirs*, he was careful to give all due credit to others, while stating his own plans and their achievement with the utmost modesty. But the results bear witness for themselves. Both in the West and in the East he led the forces of the Union to glorious victory, and finally crushed the rebellion. By his comprehensive genius he extinguished the conflagration which had long threatened the temple of Liberty, and, in obedience to the voice of the people, subsequently directed its restoration in grander and more attractive form. His deeds as general, his statesmanship as President, and his example as an American citizen have raised his country to a still higher position in the regard of the civilized world. (J. P. L.)

GRANVILLE, GRANVILLE GEORGE LEVESON GOWER, EARL, an English statesman, was born in London, May 11, 1815. He is the second Earl of the present line, having succeeded his father Jan. 7, 1846. He was educated at Eton and Christ Church, Oxford, and entered public life in 1835 as an attaché to the embassy at Paris, his father being the ambassador. He was elected to Parliament for Morpeth in 1836, and subsequently sat for Lichfield until he succeeded to his title in 1846. He was under secretary for foreign affairs, 1840–41; vice-president of the board of trade, 1848–51; foreign secretary, 1851–52; lord-president of the council, 1852–54; again, 1855–58, and 1859–66. He was colonial secretary, 1868–70, and secretary of state for foreign affairs, 1870–74, and again from April, 1880, to June, 1885. In February, 1886, when Mr. Gladstone returned to the premiership, Earl Granville was made secretary for the colonies. He was ambassador extraordinary to Russia to attend the coronation of Emperor Alexander II. at Moscow in September, 1856. He has also held other offices and positions of honor. Throughout his political career he has been prominent as a Liberal, being a leader in debate in the House of Lords.

GRAPE, the fruit of the botanical genus *Vitis*, family *Vitaceæ*, comprising shrubs with watery juice, usually climbing by tendrils, with small, regular flowers, a minute calyx, its limb mostly obsolete, and the stamens as many as the valvate petals and opposite them. The berry is two-celled, usually four-seeded. The genus *Vitis* has flowers with five petals, which cohere at the apex into a little cap, shed in flowering. In all the American species the flowers are diœcious, and exhale a fragrance like that of mignonette. The leaves have long petioles, are palmately veined, and often variously lobed, one appearing at each node or joint of the vine, with a tendril or a flower-cluster opposite. The bark is loose, stringy, and dark brown in color.

The Eastern United States are richer in true grapes than any other part of the world, having seven or eight species, four of which have yielded promising cultivated varieties. The cultivated grapes of the Eastern Hemisphere are all varieties of a single species, *Vitis vinifera*, the typical vine. This is generally considered to be of Persian origin, though it is not known in a wild state. It has been domesticated since a very early period, and has given rise to an extraordinary number of varieties. It is said that there are 1400 varieties in the French vineries alone, and 600 in the gardens about Geneva. To it are due all the wines of Europe and the East. The Zante or Corinth currants are the product of a small-fruited variety, or perhaps an allied species. *V. vinifera*, however, will not bear severe cold, and cannot be cultivated, except under glass, in the Northern United States. It grows freely in California, and is the basis of the California wines. The Pacific States have two native species, neither of which have been domesticated. *V. californica* yields large clusters of purple fruit, of a rather pleasant flavor. An allied species, *V. arizonica*, yields a grape of smaller size, but said to be quite luscious. Their value for cultivation has not been tested.

Of the grapes of the Eastern United States the most important species are, *V. labrusca*, the Northern fox-grape; *V. vulpina*, the Muscadine or Southern fox-grape; *V. æstivalis*, the Summer grape; and *V. cordifolia*, the Chicken, Winter, or Frost grape. Of these *V. æstivalis* bears a small fruit, of a bluish-black color, covered with a fine bloom. The berries, ripe in October, have a sprightly, agreeable, acid flavor. It is found in rich woods and thickets, from Connecticut to Florida, and is the highest climber of all our vines. *V. cordifolia*, the common Winter grape, is found from Canada to Florida, in thickets and on river banks. The berries ripen after frosts, and are small, blue or black with a bloom, and too acid for eating. The flowers are very sweet-scented, with a perfume like mignonette.

V. labrusca is common in moist thickets from Canada to the far South; also found in Japan. It is a low-growing vine, straggling over bushes and small trees, the branchlets and young leaves very woolly, the berries large, about ½ inch diameter, dark purple or amber color, with thickish coat and tough pulp of a musky flavor. Flowers in June; fruits, September. The "foxy" flavor disappears in the cultivated varieties, of which many have been produced, such as the well-known Isabella, Catawba, Concord, and many others. These succeed far better in the climate of the Northern States than any foreign varieties, and new seedlings are being constantly produced. *V. vulpina*, the Southern fox-grape, also called Muscadine and Bullet or Bull grape, is found on river banks from Maryland to Florida. It is found also in Japan Manchuria, and the Himalayas. It is a tall grower, climbing trees to a height of 50 feet, and is peculiar in the close, even texture of its gray bark, which does not separate in strips, like the other species. The fruit is large (½ to ¾ inch diam.), of purple color without bloom, a thick, tough skin, and a musky but not unpleasant flavor. It flowers in May, fruits in July and August. It is the original of the Scuppernong and other cultivated varieties. In the American species the flesh of the berry is separate from the skin; not adherent, as in *V. vinifera.*

Cultivation of the American species has produced many varieties, whose number has been increased by hybridization with each other and with the European grape. Several of these are of great value, from their hardiness and comparative freedom from disease, their fine flavor, and their wine-producing qualities. Of the native species *V. labrusca* has yielded the well-known Isabella, Concord, Catawba, and very many other varieties. To *V. æstivalis* we owe Cynthiana, Norton's Virginia, and Herbemont, all good wine-grapes, and various others. Of the varieties of *V. cordifolia*, Elvira yields an excellent white wine. The most important variety of *V. vulpina* is the Scuppernong. The value of this grape, however, is reduced, by its deficiency in sugar, and its habit of dropping as soon as ripe. The origin of some other cultivated varieties, principal among them the Delaware, is not known. The latter is probably a seedling of the Catawba. To these may be added many hybrids, those known as Rogers' hybrids including several excellent varieties.

The vine grows occasionally to an immense size and attains great age. Some European vines are known to be from 400 to 600 years old, and have attained a circumference of 4 feet. This size is surpassed by some American vines. One at Burlington, N. J., is said to be 6 feet 2½ inches in girth at 2 feet from the ground. At Monticito, Cal., is reported a vine 10 feet in circumference, and bearing 7000 branches, estimated to yield 18,000 lbs. of fruit. The vine is propagated from seeds, layers, cuttings, and by grafting and budding. The production of new varieties is dependent upon seed growth, the other methods being used for various economical purposes. It is subject to several diseases, some so destructive as to prevent the culture of certain varieties, or to check all grape-culture in certain localties. The most dangerous of these are the mildews, which attack the leaves and fruit, and the ravages of the Phylloxera, or root-louse of the vine. The former are fungoid growths which destroy the leaves, so that the berries are unable to ripen, and sometimes attack the grape-clusters. *Phylloxera vastatrix*, an aphid which sucks the juice from the vine-root, has been imported from America to Europe, where it has almost annihilated the vine in some districts of France. In America the *æstivalis* and *cordifolia* varieties are but little subject to its attacks, while those of *Labrusca* are often very susceptible.

The culture of the grape in the United States began at an early period, in an effort to acclimate the European varieties. Vineyards were planted in Virginia as early as 1610, and wine was sent to England in 1612. There were many later efforts made, all of which proved unsuccessful from the severity of our climate, except in the vineyards of North Carolina, where in 1750 wine-making had become a successful though small industry. Early in the present century the culture of the native grape was fairly begun by Maj. John Adlum, of Georgetown, D. C. The introduction of the Catawba to general culture in his vineyards formed an era in our grape history. But its culture became an important industry only in 1849, when Nicholas Longworth, of Cincinnati, after thirty years of experiments with foreign grapes, decided that the native grape must be our reliance. In the year named there were 300 acres of vineyards within 12 miles of Cincinnati, and 50,000 gallons of wine made. In 1850 the American wine-product was 221,249 gallons from seven States. By 1852 there were 1200 acres of vines near Cincinnati. These efforts at grape-culture were attended with many difficulties, through the attacks of vine diseases, yet the wine-making industry has continued, until now it has become of great importance in the United States. In this industry California is now at the head. As early as 1861 this State had 10,500,000 vines, which number has since that date been enormously increased.

Since 1840 the total consumption of wine in the United States has increased about 400 per cent., while the importations have increased but 17½ per cent. From 1870 to 1876 the average annual production of American and importation of foreign wines were each nearly 9,000,000 gallons. From 1877 to 1884 the average annual production was nearly 19,000,000 gallons, and the average importations only about 5,000,000 gallons. Only about one-fifth of the wine now consumed here is imported. In 1880 the acreage of vines in the United States was 181,583 acres, and the wine-product 23,453,827 gallons, valued at $13,426,175. Of this considerably more than one-half was the product of California. New York and Ohio follow next in order, while several other States produce less abundantly. New Jersey is not a large producer, but her wines have a high reputation for quality. Since 1880 the grape-culture of California has greatly increased. To her 32,000 acres of that year 50,000 or 60,000 acres were added by 1883, adding to the value of the annual product an amount of not less than $6,500,000.

Of the Eastern wine-producers the Catawba stands first as a white wine grape. The Delaware is also valuable. For red wine the Concord is one of the most useful varieties from its abundant and cheap product. Several other varieties yield wine of great excellence. It is somewhat difficult as yet to judge of the true value of American wines, from the fact that the taste of connoisseurs is adapted to the foreign product. Our native grapes have often a strong flavor, and a deficiency in sugar and consequently in alcoholic property. It is important, therefore, that they should be fully matured before use. Unless so, it is necessary to enrich the mash or mast, rather than to weaken it as in European vineyards. Cultivation, however, and the production of superior varieties by selection, and by crossing with the European vine, will doubtless in time remove all elements of inferiority, and American wines attain to the highest standard of excellence. (C. M.)

GRÄSSE, JOHANN GEORG THEODOR (1814–1885), an eminent German bibliographer, was born at Grimma, in Saxony, Jan. 31, 1814. He received his early education in the school of his native town, in which his father was a professor, and studied at Leipsic under Hermann, devoting himself to philology. He was afterwards engaged in teaching in Dresden, but in 1843 was made librarian of King Friedrich August II. In 1848 he was appointed inspector of the mint-cabinet, and in 1852 director of the state porcelain collection. In 1864 he was made one of the directors of the celebrated collection of jewels, etc., known as the "Green Vault," and in 1871 became the sole director. In 1876 he transferred the royal collection of porcelain into the Johanneum. His monumental work, *Lehrbuch einer allgemeinen Literärgeschichte aller bekannten Völker der Welt*, began to appear in 1837, but was not completed till 1860. The remarkable fulness of its bibliographical information and the mass of material collected and arranged in it render this work a unique example of German learning, industry, and patience. His *Handbuch der allgemeinen Literaturgeschichte* (4 vols., 1844–56) is a compendium of his larger work. Among his purely bibliographical works are *Bibliotheca magica* (Leipsic, 1843), *Bibliotheca psychologica* (1845), and *Le Trésor des livres rares et précieux* (1858–67). Grässe gave much attention to the myths and legends of the Middle Ages, publishing a translation of *Gesta Romanorum* (1842), a critical edition of *Legenda aurea* (1846), and essays on *Der ewige Jude* (1844), *Ritter Tannhaüser* (1846), *Sagenschatz des Königreichs Sachsen* (1854), *Sagenbuch des preussischen Staats* (1868), *Freischütz* (1875), *Deutschen Namen-, Geschlechts- und Wappensagen* (1876). He also published popular treatises on hunting, on beer, on ancient coins, on porcelain, besides excellent catalogues of the collections under his charge. His philological essay, *Unsere Vor- und Taufnamen* (1875), gives special prominence to Celtic influence on German proper names. His *Orbis Latinus* (1861) is a list of the Latin names of noted places. He also published in 1876 a popular history of Saxony, which had been prepared to accompany a series of portraits of the Saxon princes. He died at Dresden in September, 1885.

GRASSE, FRANÇOIS JOSEPH PAUL, COMTE DE, also **MARQUIS DE GRASSE-TILLY** (1723–1788), a French admiral, was born at Valette, Provence, in 1723. He entered the navy of the Knights of Malta in 1734, and was engaged in wars with the Turks. In 1749 he passed into the service of France, but while on a convoy to the East Indies was captured by Admiral Anson and was imprisoned for two years in England. In May, 1754, he was made lieutenant, and in January, 1762, captain. When France came to the assistance of America in 1778, De Grasse was made a rear-admiral, and commanded the second division in the action of July 27, 1778. Being made chief of the squadron in 1779, he sailed from Brest to join the fleet of D'Estaing at Martinique. In the next year he was engaged in three fights with Admiral Rodney. In March, 1781, he set out from Brest with a large fleet, convoying also a large land-force, to the United States. On April 28 he fought with Admirals Hood and Drake in sight of Martinique, but after four hours' fighting they escaped. In June he assisted at the taking of Tobago, and then sailed to the mouth of the Chesapeake in order to assist in the operations against Lord Cornwallis. The English admirals in vain endeavored to drive him from his position, and Cornwallis, shut up in Yorktown, was obliged to surrender to Washington, Oct. 19, 1781. For his part in this decisive victory Comte de Grasse received the thanks of Congress. In January, 1782, he captured from the British the island of St. Christopher, in the West Indies. In April he attacked Rodney near Jamaica, and gained some advantages. But drawn on by his desire to save one of his vessels which had been injured, he became reckless and in spite of his bravery was obliged to surrender, April 12, 1782, after a fight of ten hours. He was taken prisoner to London and there assisted in the negotiations relating to the peace of Sept. 3, 1783, by which the independence of the United States was acknowledged. He had returned to France in August, 1782, and published a defence of his conduct. A court of inquiry was held and he was acquitted, but was no longer employed. He retained the rank of lieutenant-general of the navy till his death at Paris, Jan. 11, 1788. He was brave but rash, and lacked the qualities necessary for the highest commands. His family was ruined by the French Revolution, and his four daughters having come to the United States received assistance from Congress in 1795.

GRASSES. See Forage Crops.

GRASSES. Ornamental. During the past quarter of a century a taste has arisen for grasses as elements in ornamentation, which has resulted in an enormous trade in them. There are large firms in Germany, France, England, and America which make their collection, preparation, and distribution a specialty in trade, and all leading florists and seedsmen make collections of dried grasses an important part of their stock in hand. Until this comparatively recent time plants were admired and cultivated chiefly for the gayety afforded by their colored flowers. When beauty was recognized in form, expression, and association, as well as in color, the leaves of plants, the fronds of ferns, and the culms of grasses especially, entered largely into human enjoyment. At first bunches of "Quaking Grass" or "Feather Grass" covered every demand, but now some of the larger firms who deal in them offer selection from between 300 and 400 species. Many of these are dried in their natural colors, but others are dyed of various shades of blue, green, orange, pink, purple, red, scarlet, or yellow, and in these forms are largely employed in arranging various parlor-ornaments, or temporary decoration of large halls for festivals. A number of species are crystallized, and then form delicate objects of graceful beauty. The grasses are tied in small bunches and hung from sticks placed across a wide-mouthed vessel into which a pound of alum and a gallon of boiling water have been placed. When the liquid has had time to cool, the immersed grasses will be found covered with frost-like crystals. It often takes 10 or 12 hours before the crystalline deposit commences.

The most popular grasses are of course those which have obtained common names by which they are generally known to the purchasing community. Of these the most esteemed is probably the Pampas Grass, *Gynerium argenteum.* It endures 10 or 12 degrees of frost without injury, but is usually killed when the temperature approaches zero. Its culms are often thrown to the height of 12 feet, with 2 or 3 feet comprising the silvery branching panicles. Very strong plants have been known with 50 of these large culms. It is a diœcious grass, the staminate plant having the finest spikes. Though many grasses have a plumose inflorescence, when a florist speaks of "plumes" he usually refers to the Pampas Grass. Many thousands of these plumes are grown in America for the home-trade and for exportation to Europe. The wholesale price varies from $25 to $100 per 1000. Those grown in California usually bring the best prices. Other popular grasses are the Quaking Grasses, *Briza maxima*, *media*, *minima*, natives of the meadows of Europe, and others cultivated from South America; Zebra Grass, *Eulalia japonica*, with variegated leaves, and plumes little inferior in magnificence to the Pampas Grass; Feather Grass, *Stipa pennata;* Hare's-tail Grass, *Lagurus ovatus*, from the south of Europe; Love Grass, *Eragrostis elegans;* Pearl Millet, *Penicillaria spicata;* Squirrel-tail Grass, *Hordeum jubatum*, of the American plains; Animated Oats, *Avena sterilis;* Job's Tears, *Coix lachryma;* Sea Oats, *Uniola latifolia;* and the Florida Sea Oats, *U. paniculata.* These last two grow on drifting sands along the sea-coasts of Carolina, and although not esteemed as highly as the Pampas Grass they are so very popular that the trade in them is enormous. The mone value of the trade is probably much larger than that in Pampas plumes. Among grasses largely used in the trade, but which are known only by their botanical names, are many species of *Agrostis*, *Aira*, *Andropogon*, *Arundinaria*, *Arundo*, *Bromus*, *Chloris*, *Cyperus*, *Eleusine*, *Elymus*, *Eragrostis*, *Erianthus*, *Festuca*, *Leptochloa*, *Melica*, *Panicum*, *Paspalum*, *Pennisetum*, *Phlaris*, *Poa*, *Polypogon*, *Saccharum*, *Setaria*, *Sorghum*, *Stipa*, *Tricholæna*, *Vulpia.* Grasses have not often much odor; but *Andropogon schœnanthus* is citriodorous, and hence has the common name of Lemon Grass, and the dried flowers of the *Anthoxanthum odoratum* are often known as Vanilla Grass. The last gives the chief odor to new-mown hay. *Hierochloë borealis*, or *Holcus odoratus* of the older botanists, has a very grateful odor when dried, and in some of the northern countries of Europe is gathered into small bundles for placing among clothes and linen to give them a pleasant fragrance. It is also hung over beds in order to aid sleep, but as it is also used to strew before the doors of churches on festivals connected with saints' days, there may be some religious associations connected with its supposed somniferous character aside from its mere fragrance. In countries where it is thus employed it is known as "Holy Grass." It is a native of the Alpine or more northern regions of the American continent, as well as Europe. According to Dr. Gray it should be the true "Vanilla Grass." (T. M.)

See Vol. XI. p. 53 Am. ed. (p. 60 Edin. ed.).

GRASSHOPPER, the common name given to various insects of distinct genus and family, and similar only as all belonging to the saltatorial Orthoptera. The term, indeed, has been used with great looseness, and it is now impossible to restrict its application. The scientific names given the saltatores, or jumpers, are also somewhat confused—different writers using different systems. Thus the term *Gryllidæ* is by some writers applied to the grasshoppers, by others to the crickets. We may here, however, consider the grasshoppers as included in the two families *Locustidæ* and *Acrydiidæ*, in both of which the great development of the hind legs gives remarkable leaping powers. Of these the *Locustidæ* have four-jointed legs and long antennæ, the end of the body in the females being provided with a long, sword-shaped ovipositor. The wing covers slope downward at the sides of the body, and overlap a little at the top. This portion is provided with strong veins and transparent spaces, and when rubbed together by the males gives the peculiar chirruping sound of this insect family. The color is usually green, and the habit nocturnal. They are mostly solitary, and never migrate in swarms like the *Acrydiidæ.* A large and well-known member of the family is the katydid, famous for its musical powers. The sound it produces may be heard at a distance of a quarter mile. It is peculiar to America.

The *Acrydiidæ* are shorter and stouter, with three-jointed legs, large heads, and short antennæ. They have no long piercer, but four short horny projections. The wing-covers are long and narrow, and the noise of the insect is made by the friction of these against the hind legs. They are social and diurnal in habit, and migrate in voracious and destructive swarms. This family includes the dreaded migratory locust of the Eastern Hemisphere, and *Caloptenus spretus*, the migrating insect which makes such havoc in the States west of the Mississippi. Another species, *Caloptenus femur-rubrum*, the common red-legged grasshopper, has at various times been similarly destructive in the North-eastern States and Canada. Fuller particulars concerning these species will be given under Locust. The ravages of the Eastern grasshopper or locust are partly atoned for by their being made an article of diet with the Arabs and Africans. They are roasted and eaten, or dried in hot ashes and stored for future use. The natives grind them to powder, from which they make a kind of soup, said to be more nutritious than palatable. Our Western farmers have not yet begun to revenge the ravages to their grain-fields in this manner. (C. M.)

GRASSMANN, Herman Günther (1809–1877), a German mathematician, was born at Stettin, April 15, 1809. He studied at Berlin theology, philology, and mathematics. In 1834 he became a teacher in the Otto school at Stettin, and in 1852 succeeded his father as professor of mathematics in the gymnasium of that town. He held this post till his death, Sept. 26, 1877. His chief works are important contributions to modern mathematics. They comprise *Die Wissenschaft der extensiven Grösse* (1844); *Geometrische Analyse* (1847); *Die Ausdehnungslehre* (1862); *Lehrbuch der Arithmetik* (1861–65). He also prepared a Sanskrit dictionary to the *Rig Veda* (1875), and a German translation of this work, with notes (1876–77).

GRASSMANN, Robert, a German philosopher, brother of the foregoing, was born at Stettin, March 8, 1815. He studied theology, mathematics, and natural sciences at Berlin, was for a time a teacher, but since 1848 has been a journalist. His works comprise *Die Weltwissenschaft oder Physik* (2 vols., 1862–73); *Die Formenlehre oder Mathematik* (1872); *Die Lebenslehre oder Biologie* (1872); *Die Wissenschaftslehre oder Philosophie* (1876); *Das Weltleben oder Metaphysik* (1881); *Das Gebäude des Wissens* (1883).

GRATRY, Auguste Joseph Alphonse, Abbé (1805–1872), a French theologian, was born at Lille, March 30, 1805. He was educated at the École Polytechnique, and afterwards entered the ecclesiastic state. In 1841 he was appointed director of the College Stanislas, Paris, and in 1846 chaplain of the normal school. Gratry criticised the *Histoire de l'École d'Alexandrie*, by his colleague M. Vacherot, and in consequence of the controversy both resigned their positions. In 1852 Gratry joined the Abbé Petetot in reorganizing the order of the Oratorians of the Immaculate Conception. In 1861 Bishop Dupanloup appointed Gratry vicar-general of Orleans, and in October, 1863, he was made professor of Christian morals at the Sorbonne. He had already published a course of philosophy under the titles *De la Connaissance de Dieu* (1855); *Logique* (1856); and *De la Connaisance de l'âme* (1857); and other works, as *Paix, méditations historiques et religieuses* (1862); *Sources, conseils pour la conduite de l'esprit* (1862). In defence of the truth and authenticity of the Gospels he entered the lists against M. Renan, and his eloquence procured his election to the French Academy in 1867. Being censured by the superior of his order for his connection with Père Hyacinthe and the League of Peace, which advocated religious tolerance, he retired from the Oratorians. In *La morale et la loi de l'histoire* (1868) he had declared the French Revolution to be a true regeneration of human society, and he issued some sharp letters against the Vatican Council, but finally retracted them Nov. 25, 1871. He died at Montreux, Switzerland, Feb. 6, 1872.

GRATTAN, Thomas Colley (1796–1864), an Irish novelist, was born in Dublin in 1796. He studied law and afterwards held a commission in the army, but having married settled at Paris, and adopting literature as his profession contributed to the *Edinburgh Review* and various magazines. He afterwards removed to Brussels, where in the revolution of 1830 he assisted in having Leopold I. called to the throne. In 1839 he was made British consul at Boston, and held this office till 1852, when he accepted a position in the queen's household. He died at London, July 4, 1864. Among his works are *Highways and Byways* (3 series, 1823–27), several novels, histories of Switzerland and the Netherlands, and *Legends of the Rhine* (1849). In his *Civilized America* (1859) he manifested a very bitter spirit towards the United States.

GRAY, Albert Zabriskie, an American clergyman and author, was born at New York, March 2, 1840. He graduated at the University of the City of New York in 1860, studied theology, and became chaplain in the Fourth Massachusetts cavalry during the latter part of the civil war. He was afterwards rector of several parishes in New Jersey and New York, and in 1883 was made warden of Racine College, Wisconsin. He has published *The Land and the Life, or Sketches and Studies in Palestine* (1876); *Mexico as it is* (1878); *The Words of the Cross* (1880); *Jesus Only, and other sacred songs* (1882).

GRAY, Asa, an American botanist, was born at Paris, Oneida co., N. Y., Nov. 18, 1810. He received his degree of M. D. in 1831 at a medical school at Fairfield, N. Y., studied botany under Prof. Torrey, and was Fisher professor of natural history in Harvard College from 1842 till 1873, when he retired from the more active work of that professorship. He published many works on botany, including *Elements of Botany* (1836); *A Manual of Botany* (1848, subsequently often revised and enlarged); the masterly *Flora of North America* (unfinished; the first volume published in 1838; the earlier volumes prepared conjointly by him and Dr. Torrey); the *Botany of the U. S. Pacific Exploring Expedition* (1st vol., 1854); *Structural and Systematic Botany* (1857); *Lessons in Botany* (1857); *How Plants Grow* (1858); *Field, Forest, and Garden Botany* (1868); *How Plants Behave* (1872); and other treatises. Dr. Gray is recognized on both sides of the Atlantic as one of the ablest systematic botanists.

GRAY, Elisha, an American inventor, was born at Barnesville, Ohio, Aug. 2, 1835. In his youth he learned carpentry and boat-building, and afterwards attended Oberlin College, supporting himself by his trade. He gave much attention to improvement of the electric telegraph, and engaged in the manufacture of telegraphic apparatus. Since 1872 he has been employed as electrician, and in 1874 he visited Europe for the purpose of study. He has taken out about fifty patents, among which are many relating to the speaking telephone, of which he claims the invention, his first specifications having been filed Feb. 14, 1876. He has also patents for multiplex telegraphy. He has published *Experimental Researches in Electro-Harmonic Telegraphy and Telephony* (1878).

GRAY, Henry Peters (1819–1877), an American painter, was born at New York, June 23, 1819. He studied art under Daniel Huntington in 1838, and went to Europe in 1839. He returned to New York in 1843, and from 1846 he devoted himself to *genre* and portrait painting, though occasionally taking historical and sacred subjects. In 1842 he was elected a member of the National Academy, and in 1869 became its president. In 1871 he went to Florence, where he remained till 1874. He died at New York, Nov. 12, 1877. Among his works are The Apple of Discord, Portia, and Bassanio, The Wages of War, and The Birth of Our Flag.

GRAYDON, Alexander (1752–1818), an American author, was born at Bristol, Pa., April 10, 1752. He was educated at Philadelphia and studied law, but became a captain in the Revolutionary army. After carrying a sum of money to Gen. Schuyler at Lake George, he joined the army at New York. He was taken prisoner, and afterwards, being released on parole, went to Reading, Pa. He was prothonotary of Dauphin county from 1785 to 1799, after which he lived on a farm near Harrisburg until 1816, when he returned to Philadelphia, where he died, May 2, 1818. He published in 1811 his entertaining *Memoirs* (republished at Edinburgh in 1822 and at Philadelphia in 1846.)

GRAYLING, a fish of the salmon family, genus *Thymallus*, of which five species are known in the clear cold streams of Northern Europe and America. It is a handsome and lively fish, of a light yellowish-brown color, and of migratory habits, wintering in the sea, and ascending the streams in early spring. It is

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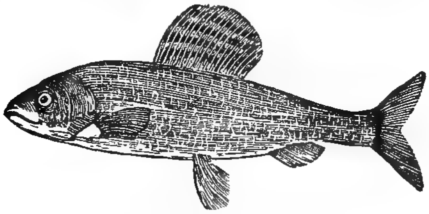
esteemed for its delicate flavor, so much so that in some countries it is reserved for the tables of the great—the lower orders being prohibited from fishing for it under severe penalties. It is a cautious fish and not readily taken with the line; of elegant form, and 12 to 14 inches, rarely 2 feet, in length. The best known species are the *Poisson bleu*, of the Canadian voyageurs, and the European grayling. In America it is found in the clear cold waters of the Great Bear and Winter Lakes, and in streams which empty into the Mackenzie River. Back's grayling (*T. signifer*), a large species of this northern region, 17 inches long, is highly esteemed by the voyageurs and Esquimaux. *T. tricolor*, found in some streams of Michigan and in the head-waters of the Yellowstone, is perhaps identical with *T. signifer*.



Grayling (*Thymallus vulgaris.*)

GREAT BASIN. Between the Rocky Mountains on the east and the Sierra Nevada and Cascade Ranges on the west stretches a vast elevated plateau, or rather series of plateaus, of varying height, and for the most part sufficiently arid to be not improperly termed a desert. The northern portion of this enclosed area is drained by the Columbia and its tributaries into the Pacific Ocean; the eastern and south-eastern portions, a region of gigantic cliffs, the escarpments of vast blocks of elevated strata, or the terminations of strata which have been removed by erosion, is penetrated in all directions by the deep cañons of the Colorado and its tributaries, discharging their waters into the Gulf of California, while the remaining portion has no outlet. This last region is the Great Basin. All the rain which falls in this area is evaporated either directly from the soil or after finding its way into some of the small lakes which dot its surface. Most of these lakes are salt, as is usually the case with lakes which have no outlet in consequence of the supply not exceeding the evaporation. The average yearly rainfall of the Great Basin is not more than 12 to 15 inches, and in the more desert parts does not exceed 4 inches.

Desert-like though may be much of the districts drained by the Colorado and Columbia, the Great Basin is even more so. It is, in fact, as true a desert as the Sahara or the deserts of Arabia; scarcely any part is available for agricultural purposes unless rendered so by irrigation, and the streams and lakes within its bounds are so scanty that only a small portion can in this way be reclaimed for human use.

The area thus isolated from the water systems of the world is somewhat greater than that of France, or five times that of Pennsylvania. From its most northern point (in Oregon, north of 44° N. lat.) to its most southern point in the northern part of the peninsula of Lower California, it extends about 800 miles; while its width in the widest part, between 40° and 41° N. lat., is about 500 miles. The calculated area of this region is 208,500 miles, chiefly included within the States and Territories of Oregon, Utah, Nevada, and California, but at its north-eastern angle extending into Idaho and Wyoming. Almost the whole of Nevada is in the Great Basin.

The northern portion of the Great Basin is the more elevated. Here the valleys have a general elevation of 4000 to 5000 feet, while the intervening mountain ranges rise 5000 to 7000 feet above them. Gradually the general level subsides until, at the southern extremity, portions are met with which are even lower than the sea-level. Such are Death and Coahuila Valleys.

The Great Basin is by no means a level plateau, but is diversified with many mountain ranges, some reaching 11,000 or more feet above the sea-level, separated from each other by broad desert valleys. The mountains exhibit a type of structure not described before this region was explored, but now recognized as the "Basin Range" structure. While most mountains have been carved by erosion out of strata which have been by subterranean forces bent into great ridges and hollows (anticlinals and synclinals), the ranges of the Great Basin are composed of huge blocks, which have been broken and tilted up on one side. They thus have one steep face, upon which the broken edges of the beds which compose them are exposed, and one gently sloping side, the slope conformable to the dip of the strata. Most of these ranges run in a north and south direction.

The structure known as "Basin Range" is not confined to the Great Basin, but occupies also that portion of Arizona situated south of the Colorado plateau, and drained by the Colorado and Gila. On the other hand, the basin of the Sevier River is a part of the Great Basin, but the elevations are plateaus of a character similar to those of the Colorado Basin. The valleys between the ridges are more barren than the mountains. Instead of shady vales, or smiling open *vegas*, they are often totally destitute of water, and treeless for many days' journey; the most prominent plant being the grayish-green *Artemisia*, or sage-bush. These valleys are filled with alluvial deposits, and in many cases can be identified as the beds of ancient lakes. In some of the mud plains, left by the evaporation of former lakes, there is scarcely a trace of vegetation, and many parts become covered to a depth of several inches with alkaline salts, which look like drifted snow. Some parts become so baked in the summer sun that a horse's hoof makes scarcely any impression, and so sun-cracked as to look like tesselated pavement. The alkaline dust, caught up by the wind, sometimes forms swaying and bending hollow columns, two or three thousand feet high, and is at all times most trying to the health and eyes of travellers. The Carson and Black Rock Deserts of Northern Nevada, and the desert west of Great Salt Lake, exhibit the extreme of desolation; but they are surpassed in area by the Mojave Desert in Southern California.

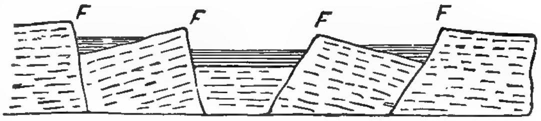


Fig. 1.

The accompanying sketch may serve to give an idea of the Basin Range structure, F F being the lines of faults, and the dotted lines representing the dipping strata. The valleys between the tilted blocks have upon one or both sides a cliff formed by the edges of the faulted beds, and are occupied either by alluvial deposits or by lakes; the former predominating in the present era. The depression bounded by the fault upon the left may be taken as a generalized expression of Surprise Valley, Cal., which once held a lake nearly 100 miles long. The central depression, bounded on each side by faults, is a rude diagram of Christmas Lake Valley, Oregon, the sides of which are formed by cliffs 1500 to 2000 feet high. Fault escarpments have in most instances been worn down by erosion, but those of the Great Basin are comparatively recent, and thus remain to testify to the great extent of the displacement.

The geological structure of the Great Basin is very complex. Into the composition of the tilted and faulted mountain blocks enter rocks of all the Palæozoic ages, including the Devonian, which is well represented in and near the White Pine district, Nevada, though, as a rule, it is inconspicuous throughout the Rocky Mountain and Western regions of this country. The various Palæozoic strata are superimposed upon a foundation of Archæan rocks, which are exposed upon the eastern and western boundaries of the Great Basin, and also crop up at isolated points of its surface. Beds belonging to the Jurassic and Triassic ages, which have not in this region been yet well distinguished from each other, are found in Western Nevada. Cretaceous and Eocene strata appear to be absent, but beds of late Tertiary age occur in Eastern Oregon, and recent deposits occupy extensive areas of the valleys and deserts.

Mountains.—The Wahsatch Range forms the eastern boundary of the Great Basin in Utah. Like the Basin Ranges, it is a north and south monoclinal ridge, presenting on the western side a bold abrupt escarpment facing Great Salt Lake, while on the more gently sloping eastern side it is covered by the great Tertiary deposits of the plateau country that drains into the Colorado. Its highest peaks are from 11,000 to 12,000 feet high. In its structure are represented all the principal formations from the Archæan to the latest Tertiaries. South of the Wahsatch Mountains is a region of high plateaus—the highest in America. Geologically they belong to the plateau region, but their drainage is carried by Sevier River into the Great Basin. To the west of the valley of the Sevier lies a range of three high tables, the southernmost, the Markagunt Plateau, about 11,000 feet high. On the opposite side of the Sevier Valley are the Sevier and Paunsagunt Plateaus, the former a table 80 miles long. East of this is the long line of Grass Valley, the waters of which burst through a profound gorge in the Sevier Plateau, and join the Sevier River. East of this valley lie four great plateaus, continuing southward the line of the Wahsatch Mountains. These are the Wahsatch Plateau, nearly as high as the mountains north of it; Fish Lake Plateau, a mesa 11,400 feet high; the Awapa, and the great Aquarius, 35 miles long and 11,600 feet high. The summits of these plateaus are not arid, and the Aquarius bears a forest.

The East Humboldt Range is the main range of Central Nevada, and the most prominent uplift lying between the Sierra Nevada and the Wahsatch. It is a single bold ridge, 80 miles long, terminating at the Humboldt River, with many rugged summits over 10,000 feet above sea-level. Mt. Bonpland, at the northern end, is 11,321 feet high. Its long slopes and glacier-covered cañon-basins are dotted with scattered forests of pines and firs.

Other ranges lying to the east of that just mentioned are the Oquirrh, Aqui, Ibenpah, Wachoe, Gosi-Ute, Egan, Ruby, Ombe, and Peoquop, all of considerable height.

Most of these ranges have the usual nearly north and south direction, and are composed of Palæozoic rocks. The Humboldt Range has an axis of Archæan rocks, upon which Devonian and carboniferous strata rest unconformably. The Wachoe Mountains are an exception to the usual structure, being an irregular group of crystalline rocks.

Westward of the East Humboldt lie the Augusta, Havallah, and Pah-Ute, with other minor ranges, and still farther west the West Humboldt Mountains, culminating in Star Peak, 9925 feet above sea-level. The Virginia Range is the first of the north and south ranges lying to the east of the Sierra Nevada. It is 150 miles long, stretching from 38° 10′ to 40° 15′ N. lat., and is thus one of the longest of the Basin Ranges.

The celebrated Steamboat Springs are situated near the base of a volcanic hill on the western side of the Virginia Range. They cover an area a third of a mile long by 800 to 1000 feet wide. Siliceous sinter covers the ground, formed by the evaporation of the spring-water. Steam, and occasionally jets of hot water, 10 to 15 feet high, are cast up from fissures. Many other thermal springs are found in various parts of the Great Basin.

Other ranges rather farther to the south in Western Utah are the Onaqui, Thomas, Beaver Creek, and House. In Southern Nevada and South-eastern California are the Amargosa and Funeral Mountains, east of Death Valley; the Panamint Range, west of that depression, and the Inyo Range, immediately east of the Sierra Nevada, which it almost rivals in grandeur, and exceeds in loneliness.

South of the Inyo and Panamint Ranges are the Opal, Payute, and Dead Mountains, which are not more than 5000 or 6000 feet high, and south of these the Chocolate, Chucavalla, and Riverside Mountains, which hardly average 4000 feet.

The Stein Mountains, rising 4000 to 5000 feet above Alvord Lake, are the most striking elevations of South-eastern Oregon, and in grandeur of scenery exceed most of the Basin Ranges.

Lakes and Rivers.—Some of the lakes near the borders of the Great Basin have outlets, discharging their waters into a lake or sink at a lower level. These upper lakes, fed by springs and melting snow, are pure and fresh. The finest of them is Lake Tahoe, a beautiful sheet of water, which lies amid the peaks of the Sierra Nevada, at a height of 6247 feet. Its outlet, the Truckee River, flows downward to Pyramid and Winnemucca Lakes, 2400 feet lower; there the water is evaporated, leaving the lakes charged with salts of soda. Lake Tahoe is 21 miles long, and 12 wide in its widest part. It is probably the deepest lake in the United States, since soundings indicate depths of 1385, 1495, 1524, 1600, and 1645 feet. The waters abound in fish, and also in fresh-water entomostraca.

On the opposite or eastern side of the Great Basin lie Utah Lake, which discharges its waters through the Jordan into Great Salt Lake; and Bear Lake, the surplus waters of which are conveyed by Bear River into the same reservoir.

Although all lakes which have no outlet become in time charged with salts, there is great difference in the degree of salinity. Great Salt Lake is exceedingly saline, while Pyramid, Winnemucca, and some others are but slightly so. This may not improbably be due to the entire evaporation of the waters and deposition of the salts, which then become buried under the mud brought down by subsequent storm-waters, so that, on the return of conditions sufficiently humid to permit of the formation of a permanent lake, its waters were comparatively fresh.

Great Salt Lake is a broad, shallow sheet of water, 80 miles long by about 32 wide at its greatest expansion. At its deepest part it is not more than 50 feet deep, and broad belts along the shore-line as well as the inlets have less than 10 feet. It receives its water supply from four rivers: the Bear, Ogden, Weber, and Jordan, which lead into it the drainage of the entire surface of the Wahsatch Range, and much of that of the Uintas. The superficial area of the lake was in 1869 ascertained to be 2360 square miles, while in Stansbury's map, made in 1849–50, it is shown to cover only 1700 square miles. From the depths of water given on Stansbury's map, and from information given by settlers, it appears that the rise of the lake commenced about 1861. The lake is evidently still rising, and it is the belief of some that the rise has been caused by the agency of man in clearing the forests from the mountains to the eastward, and cultivating the soil, the total effect being to allow more water to enter the lake.

The water of Great Salt Lake is remarkable for its great density and pungent bitterness. The human body floats cork-like on its surface. The water obtained by Stansbury in 1850 contained 22.4 per cent. of mineral matter; but in 1869 the dilution had been so great that only 14.8 per cent. was found. Common salt forms nearly four-fifths of the solid contents, the remainder being chiefly chloride of magnesium, and the sulphates of soda and potash. There is very little sulphate of lime.

Lake Mono, Cal., is 14 miles long and 10 wide. Its waters are strongly charged with sodium carbonate, and contain smaller quantities of lime carbonate, common salt, and borax. The lime carbonate formerly held in solution has been to a great extent deposited in irregular fungoid and coralloid masses of tufa, which stand up thickly on the level shores, and in the shallow marginal waters of the lake. Near the centre of the lake is a group of volcanic islands, in direct line with the extinct volcanic cones, which form a series of twenty or more from the lake margin to a distance of some 15 miles to the southward. These volcanoes vary from 200 to 2700 feet high. There is every probability that they were active since the glacial epoch. Prof. Le-Conte, upon his visit to this lake in 1872, found ample proof that the lake had risen 10 or 12 feet in about as many years.

Pyramid Lake, according to King, rose 9 feet, and Winnemucca Lake 22 feet, in a shorter time. These facts, together with the rise of several lakes in the extreme north of the Great Basin, in one case sufficient to unite two formerly distinct lakes (Malheur and Harney), tend to show that, independently of any interference caused by man, the lakes of the Basin are, on the whole, rising.

Owens Lake has about 110 miles of surface. It is fed by Owens River, about 30 miles long, and is bounded by the Sierra Nevada on the west, and the Inyo Range (10,000 feet high) on the east. The salts of its waters are chiefly sodium carbonate and common salt, in nearly equal quantities, but potassium and sodium sulphates are abundant. The saltness is about twice that of sea-water. A yellowish-green alga abounds in the lake, and is fed upon in great numbers by a curious species of fly not found elsewhere. The larva inhabits the lake, and is considered a delicacy by the Indians.

The longest river of the region is the Humboldt, which, after a course of 300 or more miles, and after receiving Reese River, loses itself in Humboldt Sink, not far from the spot where the Carson loses itself in Carson Sink. The group of lakes and sinks in this part of Nevada are the remains of the former Lake Lahontan. Bear River rises south of Bear Lake, runs with a general northward direction by that lake, with which it communicates by a marsh, and continues northward until it encounters the basalt of Basalt Valley. Here it turns west and then south, flowing through Gentile and Cache Valleys to Great Salt Lake. Its circuitous course is paralleled by that of the Sevier, which, after running northwards for two degrees among the high plateaus, turns south-west, crosses the Sevier Lake Desert, and terminates in Sevier Lake.

In Eastern Oregon there are a number of small lakes, most of which are included in the Great Basin, though some, as the Klamath Lakes, have an outlet. It seems as though during the humid quaternary period the lake which occupied the Klamath Basin cut down its outlet so low that the region became permanently tributary to the ocean. The normal condition of Goose Lake is that of a feeder of the Sacramento, but during recent years it has not overflowed. Some of the lakes are what may be called "playa" lakes, *i. e.*, their waters evaporate to dryness during arid seasons, leaving mud-plains or playas. Many such playa lakes are to be met with in the Great Basin. The only truly fresh-water lake of the group north of Lake Lahontan is Silver Lake, the waters of which are almost without a trace of mineral matter, a fact which is the more singular as it is situated in the midst of a quaternary lake which never overflowed, is itself without outlet, and is not more than ten feet deep. The remaining lakes are somewhat alkaline and brackish, but are in most cases sufficiently pure to afford watering-places for stock, and even to be used for culinary purposes for a while.

Summer and Abert Lakes are strong solutions of potash and soda salts, and are richer in potash than Lake Mono, the potassium salts of the water of Abert Lake amounting to five-sevenths of the total solids. No fishes live in these lakes, but they are tenanted by countless millions of brine-shrimps (*Artemia*).

Alvord, Guano, Massacre, Warner, and Christmas Lakes, as well as those of Surprise and Long Valleys, are playa lakes, and even the larger lakes are very shallow. Goose Lake, the deepest, does not exceed 20 feet.

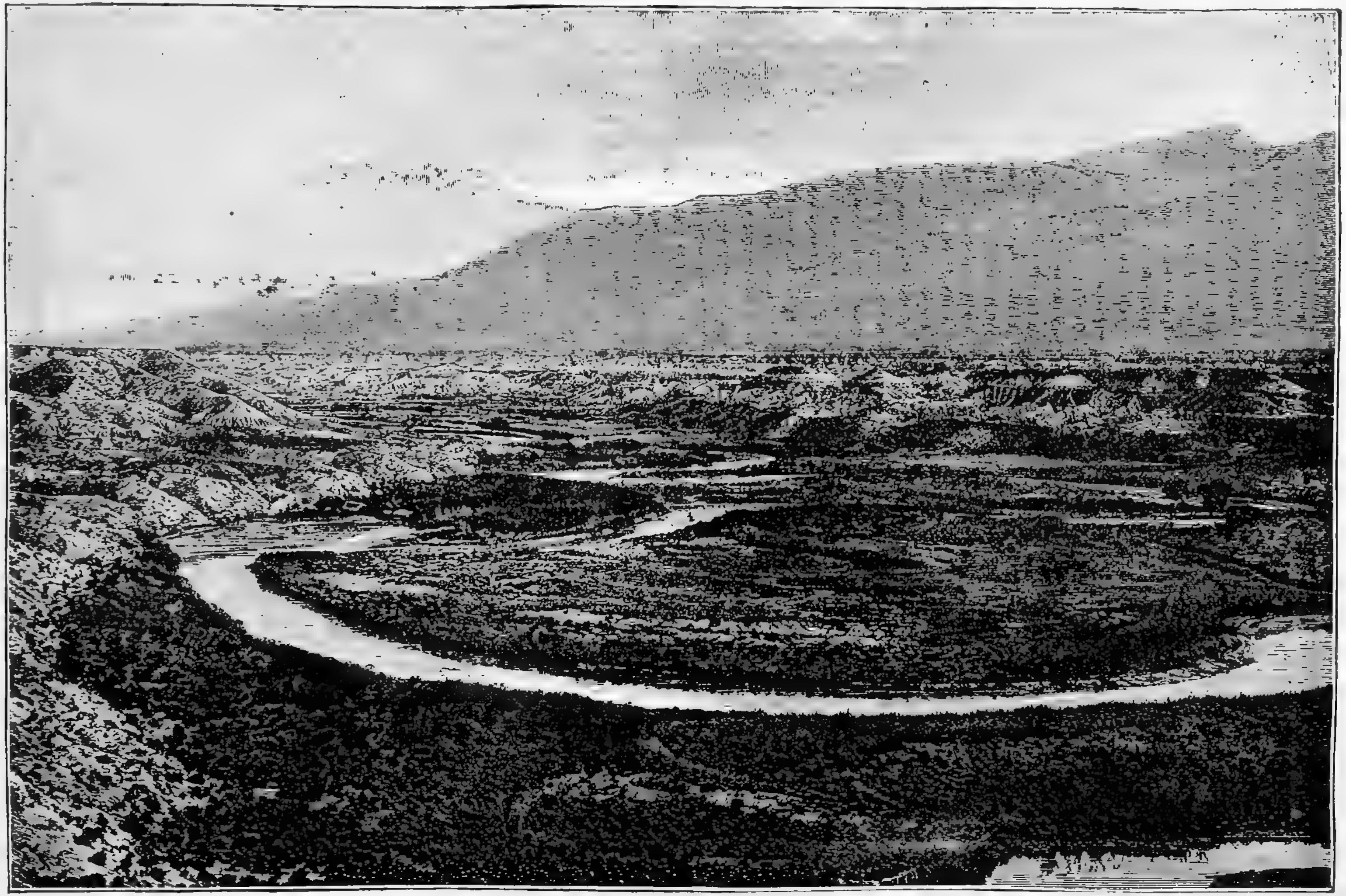
Quaternary Lakes.—At the time when New England and many of the more Northern States were covered with a sea of ice through the great excess of precipitation over evaporation, a similar excess accompanied by somewhat less frigid conditions caused the Great Basin to be in large part occupied by a number of lakes. Twenty-one of these lakes, the two principal of which have been named Lake Bonneville and Lake Lahontan, have been explored in the northern part of the basin, and at least three of considerable size are known to have existed in the south. The drainage area of the two lakes just mentioned occupied the whole breadth of the Great Basin at 41° N. lat. Perhaps the largest of the southern lakes was that which occupied Death Valley and extended a degree to the southward of it.

The depressed area of the Coahuila Valley was once a lake with an area of over 1000 square miles. Millions of minute fresh-water shells are still to be found among the coarse granite sand of its western shores.

Lake Lahontan.—Lake Lahontan was one of the most eccentrically shaped bodies of water that ever existed. Pyramid and Winnemucca, Humboldt and Walker Lakes, the two Carson Lakes, and Honey Lake in California, were included in its bed, as were also what are now Black Rock and Carson Deserts. Its greatest length was about 260 miles. The actual water area was much inferior to that of Lake Bonneville, for it enclosed an island 126 miles long by 50 wide. The two main bodies of water lay north and south of this island, and were united by a western arm which occupied the valley of Pyramid Lake and part of that of the Truckee River, and by an eastern arm which stretched up the Humboldt Valley. The large central island bore several rugged and lofty mountain ranges, and included in the interior two small lakes which did not overflow into the larger one. Humboldt River and its tributary, Reese River, were the chief feeders of this lake from the east, while on the west it received the waters of Lakes Tahoe and Mono, of Washoe Valley, and of a lake which formerly occupied the Madeline Plains, Lassen county, Cal.

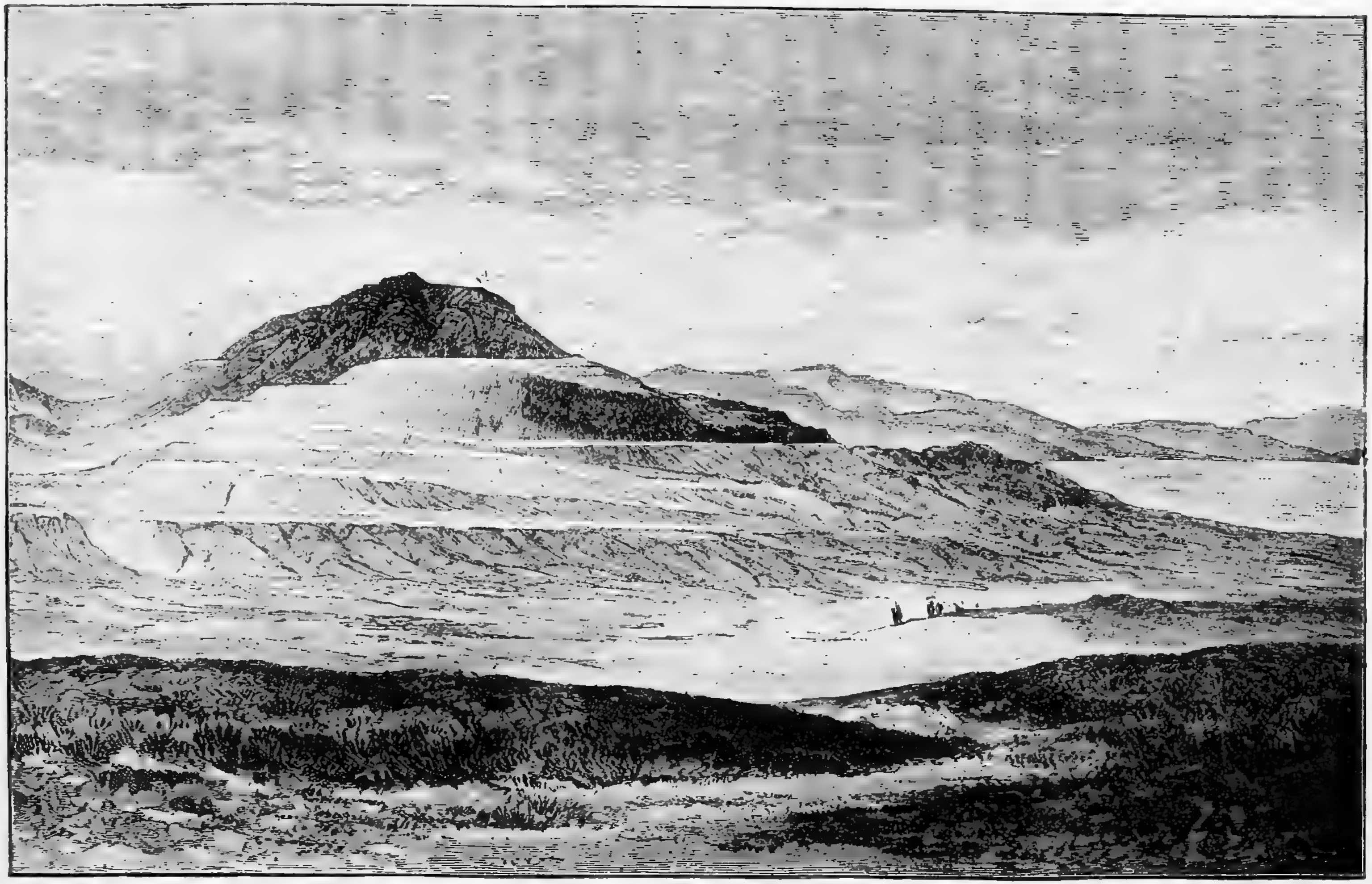
Along the Humboldt River cliffs of clay and marl, sometimes 150 to 200 feet high, show at once the depth of the alluvium and the erosive action of the river since the disappearance of the lake. Carson Desert was once covered with water to a depth of 500 feet, and a large portion of this desert, with some outlying areas, continued to form a lake after the waters had left Black Rock Desert and Quinn River Valley. The area of the drainage basin was about 45,000 square miles. The evidence of the former existence of this lake is unmistakable; the ancient shore-line is clearly defined throughout, and its continuity proves that there was no outlet. The coasts of the lake are scored by several horizontal terraces, each cut by the waves at a period when the lake maintained approximately the same height. The highest wave-cut terrace is not conspicuous, but at a level 30 feet lower is a broad terrace sometimes, as on the south side of Carson Desert, 200 to 300 feet wide, marking a level at which the lake stood for a long period. Four hundred feet below this, and 100 feet above the level of Pyramid Lake, is another dis-

PLATE XXVIII.



LAHONTAN LAKE BEDS IN HUMBOLDT VALLEY.

PLATE XXIX.



RESERVOIR BUTTE. SHOWING TERRACES OF THE BONNEVILLE SHORE LINES.

tinctly cut terrace. Deposits of carbonate of lime, in the form known as tufa, rise from the alluvial beds of the lake bottom to various heights, and three structurally different kinds of tufa mark three stages in the history of the lake. The most stony and massive form, *A*, is found from the terrace 30 feet above the highest line to the lake-beds of the bottom; that marked *B* extends only to the lowest terrace; while that marked *C*, which is deepest and most abundant, reaches to within about 200 feet of the highest water-line; proving that, after the bed *B* was deposited, the waters rose again, though they did not remain long enough at one level to score a broad and well-defined terrace. Remains of fresh-water shells prove that the lake was fresh at both its high-water periods. Large quantities of salts, chiefly common salt, but including borate, sulphate, and carbonate of soda, and borate of lime, are contained in the lake-beds, and are worked for salt and borax.

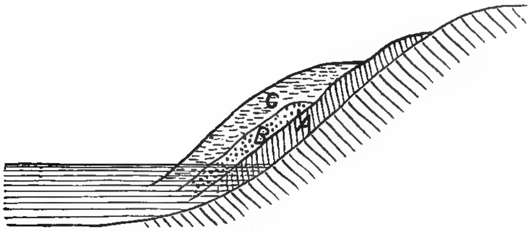


Fig. 2.

Lake Bonneville.—Lake Bonneville is the largest of the ancient lakes of the Great Basin, its surface covering 19,750 square miles, while its drainage basin occupied 52,000 square miles. Its greatest length was more than 300 miles, its greatest width about 150 miles. Not only the existing Great Salt Lake and the broad desert to the west of it were in the Quaternary period covered with water, but Utah and Sevier Lakes were also merged into the sheet, which sent out prolongations in various directions, particularly towards the south, where a long inlet has been named Escalante Bay. The highest water-line is 1000 feet above the level of Great Salt Lake, and evidence of the action of the waves can be found at every foot of the intervening profile. This highest water-line is one of the most conspicuously marked; but the most prominent line of all is 400 feet lower, and has been named the Provo shore-line. Four or five prominent shore-lines can usually be seen between the highest or Bonneville line and the Provo. The prominence of the upper shore-line led to search for an outlet, and this was found at the northern end of Cache Valley, at the north-eastern termination of what was once a bay of the lake. The stratum over which the water first discharged was of soft material, and the level at which it was first crossed corresponds to the Bonneville shore-line. The soft sill wore downwards with comparative rapidity, until at length a reef of limestone was reached. This marks the level of the Provo shore-line, and at this level the lake remained until climatic changes diminished the water-supply. The water which escaped from the lake found its way into the Snake branch of the Columbia, so that at this period the basin of Lake Bonneville formed part of that of the Columbia. At the present time there is at the former outlet a marsh, from which a stream flows southward to Bear River and Great Salt Lake, while another passes northward to the Columbia.

The lake-beds consist chiefly of two deposits: yellow clay at the bottom and upon it a layer of white marl from 10 to 20 feet thick. A wedge of gravel interposed between these beds along the mountain margins, together with evidences of erosion upon the surface of the clay, prove that the two beds were deposited at different periods, between which periods the lake partially dried up, and rains washed down the gravels and wore away the surface of the clay. The clay can be traced to 800 feet above Great Salt Lake, while evidences of subsequent wear are found to within 200 feet of the same level. The marl can be traced as high as the clay.

The chief difference between the lower and upper stratum of lake deposits is the larger proportion of the carbonates of lime and magnesia contained in the upper.

Shore-lines must have been level when formed by wave-action, but at the present time neither are the Provo and Bonneville lines horizontal, nor are their deviations from horizontality parallel. These facts prove that there have been earth-movements since the lines were formed, and these movements were apparently of such a nature as to raise the central portion of the ancient lake, and thus to compel the waters of its remnant, Great Salt Lake, to occupy the eastern side of its former basin.

In Quaternary times some of the valleys north of Lake Lahontan contained lakes of great depth. The conspicuous highest beach-line of that which once occupied Surprise Valley is 350 feet above the lake-beds. The long narrow Quaternary lake east of the Stein mountains, of which Lake Alvord is the last remnant, had a depth of 400 feet. Yet neither of these had an outlet.

Zoölogy and Botany.—There are few peculiarities in the animals of the northern part of this region, but the southern portion is nearly related to Northern Mexico as regards its fauna. The buffalo is not now found in the Great Basin, but the big-horn sheep (*Ovis montana*) occurs. The various lakes contain peculiar forms of fishes, most of them belonging to the carp and minnow tribe (*Cyprinidæ*) or to the suckers (*Catostomidæ*), and white-fish and trout occur.

The valleys of the southern portion are the habitat of many lizards and snakes, which do not extend into the northern part.

The flora of the Great Desert is, on the whole, poor. The prevailing plants are undershrubs, such as wormwoods or artemisias, among which the sage-bush is most common, chenopods or goosefoots, and woody small-flowered compositæ. No portion, however, bare of trees or grass, is absolutely without vegetation, unless it be the alkali flats, and even these bear frequently a scattered growth of greasewood (*Sarcobatus*) and *Halostachys.* The characteristics of the vegetation are the wide distribution of a few low shrubs or half-shrubby plants, the want of a grassy green-sward, and the universal dull olive or gray color of the herbage. The sage-bush (*Artemisia tridentata*), though the most widely spread species, does not take kindly to alkaline soil, which is preferred by *Halostachys.* There are but few species peculiar to the basin. The Yucca, and other sub-tropical plants, enter Southern Nevada and the Mohave Desert.

The agriculture of the Great Basin is limited to those areas which can be irrigated. Of more importance, at least at present, is the grazing of sheep and cattle on the bunch grass that abounds in many parts of the mountains, and sometimes grows luxuriantly beneath the sage-bush.

The principal source of wealth, however, and that to which Nevada owes its admission as a State, is mining, and there is also a growing industry in salt, borax, sulphur, and carbonate of soda.

Our knowledge of the Great Basin, as outlined in the foregoing sketch, is due to the explorations and researches of Israel C. Russell, S. F. Emmons, A. Hague, G. K. Gilbert, C. E. Dutton, and O. Loew, who have contributed valuable reports to the *U. S. Geological Survey* (1880–83) and other government documents. (W. N. L.)

SeeVol. XI. p. 73 Am. ed. (p. 80 Edin. ed.).

GREECE, by the convention of May 24, 1881, acquired from Turkey 5142 square miles of new territory. This acquired area comprised the greater part of ancient Thessaly and a considerable share of South-eastern Epirus. The new boundary line commences at the N. E. on the W. shore of the Gulf of

Thessalonica, at a point 4 kilometres S. of Platomona. Its direction in general is irregularly S. W., being mainly determined by mountain crests until the river Arta is reached. From that point the stream is followed southward to the Gulf of Arta; and the town of Arta, with that part of Epirus which lies E. of the river Arta, thus becomes Greek territory. In Thessaly the valley of the Peneus is almost entirely Greek; but its northern tributary, the Xeragis, is still Turkish. The newly acquired lands include some of the very best agricultural tracts in the kingdom.

The new territories constitute the eparchies of Larissa in the E., and of Trikala in the centre; while W. of the Pindus range is the Epirot district of Arta —the latter a mountainous region, bisected from N. to S. by the river Achelous or Aspropotamo.

The total population of the kingdom in the year 1879 was 1,679,470. The population of the districts annexed in 1881 is given as 299,953, which brings the total population up to 1,979,423.

The principal cities and towns of Greece are Athens (population, 63,374); Patras (25,494); Hermenopolis (21,245); the Piræus (21,055); Corfu (16,515); Zante (16,250); Tripolis (10,057); Argos (9861); Pyrgos (8788); Argostoli, Kalamata, Chalcis, Spezzia, Hydra Mesolonghi, Messene, Lixouri, Kranieli, Lamia, Poros, Megara, Vostitza, Agrinion, Ithaka, Nauplia, Sparta, Thebes, etc., and in the new districts Larissa (13,169); Volo (7316); Trikala (5563); Arta (4990); Karditza, Tyrnovo, etc. The chief ports for foreign trade are the Piræus (the chief port for Athens), Hermopolis (Syra), Patras, Corfu, Cephalonia, Nauplia, Kalamata, Chalcis, Engasteria, Volo, Mesolonghi, and Katakolo, the last named being the port for Pyrgos.

The commerce, both in imports and exports, is double what it was twenty years ago. The imports are more than double the exports in valuation, and they have been so for a long term of years. The articles of export are cattle, hides, skins, bones, cheese, honey, cocoons, silk, wool, emery, lead, zinc, ores of zinc and of iron, millstones, barley, wheat, flour, madder, anise seed, sumac, vallonia, tobacco, cotton, yarns, cotton-seed, olives, oil, oranges, lemons, figs, currants, citrons, hemp-seed, sulphur, marble, sponges, wine, soap, spirits, rags, etc. The direct trade with the United States is almost entirely an export of currants, and a much smaller import of petroleum in cases; some wine, soap, oil, tobacco, and goat-skins are shipped to the United States. The country has a large and increasing customs revenue, and the old burdensome levy of one-tenth in kind of all land products was abolished in 1881. Since that time there has been a marked improvement in the Greek finances; but the country is still very far from being in a healthy condition as respects taxation, currency, and balance of trade.

Up to 1883 there were but two railways in Greece, one 5¼ miles long, from Athens to the Piræus, and another of about the same length from the Laurion mines to the port of Ergasteria. In 1883 a railway of 8 miles was opened from Pyrgos to its port, called Katakolo, and a steam-tramway runs from Athens to Phaleron. A railway is being built from Athens to Corinth and Patras, and another from Volo to Larissa, with a branch from Velestina to Kalabaki, and an extension to Lamia and Athens. This railway will connect Athens with the general railway system of Europe. The ship-canal across the Corinthian isthmus is being slowly forwarded. Drainage works are going on which are designed to remove the waters of Lake Copais, in Bœotia. This operation will render fertile more than 50,000 acres of marsh and mere. Greece owns 6700 coasting vessels, 5200 sea-going vessels, and some 300 steamers. Many foreign lines of steamers ply the Greek waters, and the Piræus, Syra, Patras, and the other large Greek ports are alive with a spirit of pushing commercial activity. (C. W. G.)

GREEN, Ashbel (1762–1848), an American clergyman, was born at Hanover, N. J., July 6, 1762. His father, **Jacob Green** (1722–1790), was born at Malden, Mass., Jan. 22, 1722; graduated at Harvard College in 1744; was ordained at Hanover, N. J., in November, 1746; was made vice-president of Princeton College in 1757; was a zealous patriot in Revolutionary times; published some works on church government; and died at Hanover, May 24, 1790. Ashbel graduated at Princeton in 1784, and was tutor in the college until 1786, when he was licensed to preach. He was ordained as colleague to Rev. Dr. Sproat, in Philadelphia, in 1787, and became pastor in 1793. He was also chaplain of Congress from 1792 to 1800. In 1802, when Princeton College was destroyed by fire, the president, Rev. Dr. Smith, travelled through the States to collect funds, and Dr. Green supplied his place. He also took an active part in establishing the Princeton Theological Seminary in 1812, and was president of its directors until his death. He was also president of Princeton College from 1812 to 1822. He then returned to Philadelphia, where he edited and published the *Christian Advocate*, a religious monthly. He died at Philadelphia, May 19, 1848. He published a *History of Presbyterian Missions*, *Discourses on the College of New Jersey*, and some other works, including his father's *Autobiography*.

His son, **Jacob Green** (1790–1841), was professor of chemistry in Princeton College, 1818–22, and afterwards till his death professor of chemistry in Jefferson Medical College, Philadelphia. Besides several scientific works he published *Notes of a Traveller through England and Europe* (1831).

GREEN, Horace (1802–1866), an American physician, was born at Chittenden, Vt., Dec. 24, 1802. He graduated at Middlebury College, Vt., in 1824, and studied medicine at the University of Pennsylvania and in Paris. He practised at Rutland, Vt., but in 1835 removed to New York. In 1840–43 he was professor of the theory and practice of medicine in the Medical College at Castleton, Vt. He assisted in founding the New York Medical College, where he held the same chair from 1850 to 1860. He also assisted in founding and editing the *American Medical Monthly* in 1854. His works relate chiefly to diseases of the throat and air-passages, the last being *Pulmonary Tuberculosis* (1864). He died at Sing Sing, N. Y., Nov. 29, 1866.

GREEN, John Richard (1837–1883), an English historian, was born at Oxford, Dec. 12, 1837. He was educated at Magdalen College School and entered Jesus College in 1856. He seems to have found the college and its studies uncongenial, and devoted himself chiefly to historical reading. By some papers on "Oxford in the Eighteenth Century" he attracted the notice of Dean Stanley, and, though trained as a rigid high churchman, he was greatly influenced by the genial dean. This influence led first to Green's taking orders in 1860, when he became curate of St. Barnabas' Church, a poor parish in the east of London. In 1862 he had charge of Hoxton, and in 1865 was made vicar of St. Philip's, Stepney. Overwork, especially during the cholera in 1868, obliged him to retire, and Archbishop Tait made him librarian at Lambeth, in succession to Prof. Stubbs. Green had already become a frequent contributor to the *Saturday Review*, and he now began to work on his *Short History of the English People.* Although obliged to go abroad during the winters on account of the state of his lungs he had his book ready for publication in 1874. It was received with the utmost enthusiasm, as the most lifelike presentation of English history which had yet been prepared. The University of Edinburgh quickly conferred on the author the degree of LL.D. After a time some severe criticisms were made on the inaccuracy of the *History* in minor particulars, but when due allowance is made for the circumstances of its preparation these fade into insignificance. In later editions they have been carefully corrected. The great success of the first work led to an enlargement of the *History* in four volumes (1878–80), the new work being marked by the same characteristics as the former.

Meantime the author had been happily married to a daughter of Archdeacon Stopford, who watched carefully over his precarious health. In 1877 he gathered a number of his essays into a book under the title *Stray Studies.* He also sought to go more deeply into the racial foundation of England's greatness, and in 1882 published a masterly work on *The Making of England.* In continuation of this he was preparing another work, to be called *The Conquest of England*, when his labors were cut short by death. He died at Mentone, Italy, March 7, 1883. Green is noted above all other English historians by his possession of the imaginative faculty. His characters live, move, and act on each other as do men in the world around us. Distant places and times are made to come before us with the distinctness with which we see the lands we journey through. Here or there may be an inaccuracy in detail, but in the main we have in Green's *History* the true picture of the wonderful growth of the English people and their institutions. Such was the fertility of his mind, his friends assure us, that when almost physically incapacitated for further progress in the few noble works he has left, he threw off projects and plans of important works which might have occupied an ordinary lifetime.

GREEN, SETH, an American fish-culturist, was born at Rochester, N. Y., March 19, 1817. He had only a common-school education and became a fisherman. His business steadily increased until he had many persons in his employ along the lakes and rivers of New York. Finding the supply of fish steadily diminishing he turned his attention to fish-culture. In 1838 he carefully observed the habits of salmon when spawning, and was convinced of the practicability of increasing the yield from spawn. By the best methods in vogue he found the yield only 25 per cent.; but by diminishing the amount of water used he increased the yield to 95 per cent. By invitation of the fish commissioners of four New England States, he restocked the Connecticut River with shad in 1867. He afterwards carried out his plans on the Hudson, Susquehanna, and other rivers, with like favorable results. In 1868 he was appointed on the New York State Fish Commission, and in 1869 was made State superintendent, which position he still holds. He has published *Trout Culture* (1870); *Fish-hatching and Fish-catching* (1879).

GREEN, WILLIAM HENRY, an American clergyman, was born at Groverville, Burlington co., N. J., Jan. 27, 1825. He graduated at Lafayette College, Easton, Pa., in 1840; studied theology at Princeton, and in 1846 became tutor in Hebrew there. He was ordained in 1848, and soon after installed pastor in Philadelphia, but in 1851 he was called to his life-work as professor of Hebrew and Old Testament literature in Princeton Seminary. He has received the degree of D. D. from Princeton College and from the University of Edinburgh, and the degree of LL.D. from Rutgers College. He has published *The Pentateuch Vindicated from the Aspersions of Bishop Colenso; Hebrew Grammar; Hebrew Chrestomathy; The Argument of the Book of Job Unfolded; Moses and the Prophets.*

GREENBACK PARTY. During the civil war of 1861–65 it was deemed expedient for the Federal government to issue "greenback" notes to a very large amount, and as a consequence the currency of the country became much inflated. As an inevitable result prices went up beyond all recent precedent; while the supply of the army with the necessaries of subsistence created a great demand for all kinds of farm productions. When the war broke out many Western farms were heavily mortgaged, and their owners were paying ruinous rates of interest. The inflation of the currency gave great relief to land-owners thus burdened, and practically enabled them to pay off their debts for much less than they really owed. When the period of contraction came, after the end of the war, the conditions were reversed. That period helped the creditor class and pinched the debtors. Many persons of the latter class were also much disturbed by the reflection that capitalists were getting the full principal and large interest on bonds for which they had in many cases paid no more than 35 cents on the dollar. What was called in 1868 "the Ohio idea" was the demand that all bonds which did not distinctly call for payment in coin should be redeemed in greenbacks. This "idea" seems to have dominated the Democratic convention of 1868, but was distinctly disavowed by Mr. Tilden and other leading Democrats. Many local and State conventions in the West, chiefly Democratic, endorsed the idea. Its advocates still hoped to bring the entire party to their way of thinking.

The financial crisis of 1873 caused the masses of the people to seek legislative relief for the evils from which they were suffering, and produced a certain disintegration of the established political parties. The pressing questions of the time appeared to require and justify new political organizations. The Greenback convention, held at Indianapolis in 1874, demanded: (1) The withdrawal of the national bank-note currency; (2) That the only currency should be of paper, and that such currency should be made exchangeable for bonds bearing interest at 3.65 per cent.; and (3) That coin might be used for the payment of the interest and principal of such bonds, and such only, as expressly called for coin payments. In 1876 a National Greenback convention was held at Indianapolis, which nominated Peter Cooper, of New York, and Samuel F. Cary, of Ohio, for President and Vice-President of the United States. In the election which followed they received 81,737 popular votes.

To these attempts to found a new party, based on financial issues, a turn in another direction was given by the labor troubles which had culminated in the great railroad strikes of 1877, by which transportation was suspended for two weeks on some prominent lines. When the season came for political action, the Greenback leaders sought and found favor with the laboring classes. In 1878 a "National or Greenback-Labor Convention" was held at Toledo, Ohio, as the result of a coalition between the Labor Reformers and the advocates of a greenback currency. In the following election the Greenback-Labor tickets polled over 1,000,000 votes, and 14 representatives of the party were sent to Congress. But the party was made up of incongruous elements; and although the distresses which gave it such a sudden increase of strength were real, none of the party leaders seem to have had definite ideas as to what was to be done to effect a cure. In 1880 the Greenback-Labor convention, at Chicago, nominated for the offices of President and Vice-President, James B. Weaver, of Iowa, and B. J. Chambers, of Texas. In that year the popular Greenback-Labor vote was 301,867, and 8 of their representatives were elected to Congress. The ticket in 1884 was headed by Gen. B. F. Butler, and received 175,380 votes. In that year the Greenback ticket in Iowa, Michigan, and Nebraska was fused with that of the Democrats, and in Missouri and West Virginia with the Republican ticket.

The Greenback party proper has always had its strongest support in the Western States. In Maine, New York, Vermont, and Massachusetts the Greenback element has been made up of labor-reformers, and its tickets have generally been supported principally by laboring men. But on several occasions the Greenbackers have received much encouragement and support from either one or the other of the two great parties of the country, who have hoped to create a diversion in their own favor by running a third ticket so made up as to draw votes from the opposing party.

The papers of Henry C. Baird and *The Currency Question*, a pamphlet by G. M. Steele, contain moderate and well-considered statements of the views of the Greenback party. The literature of the subject, *pro* and *con*, is large, but much of it is unprofitable reading. (C. W. G.)

GREEN BAY, a city of Wisconsin, county-seat of Brown county, stands at the head or southward extremity of Green Bay, a great inlet of Lake Michigan, nearly 100 miles in length. The town is on the east bank of the navigable Fox or Neenah River, opposite the town of Fort Howard. The city has excellent harborage for lake vessels of the largest class; while the Fox River, the short Portage Canal, and the Wisconsin River give it a steamboat connection with the Mississippi. The Green Bay, Winona, and St. Paul Railroad runs west 214 miles, and the Milwaukee and Northern Railroad gives the city north and south connections. Green Bay is especially prominent as a point for the manufacture and shipment of lumber. Its other manufactures are large and varied. The fisheries are also important, trout, white-fish, and the other species of lake-fish being extensively taken. The streets are paved, and the buildings, public and private, are very generally handsome and substantial. The town is well supplied with schools, churches, banks, and newspapers. It is the see of a Roman Catholic bishop, and has a handsome cathedral. The French settlements in this vicinity date from 1745, or earlier; but the town site was not regularly built upon before 1830. Green Bay was incorporated as a town in 1839, and as a city in 1854. The population in 1870 was 4666, and in 1880, 7464; while Fort Howard, its western suburb, had a population of 3083.

GREENE, George Washington (1811–1883), an American author, was born at East Greenwich, R. I., April 8, 1811, being a grandson of Gen. Nathaniel Greene (for whom see Encyclopædia Britannica). He was educated at Brown University, but in 1827 was compelled to leave by ill health. He then went to Europe where he resided until 1847, being U. S. consul at Rome from 1837 to 1845. Returning to America, he was appointed professor of modern languages in Brown University and edited some historical text-books. In 1872 he was made non-resident professor of American history in Cornell University. He died at East Greenwich, R. I., Feb. 8, 1883. He published *Historical Studies* (1850); *Biographical Studies* (1860); *Historical View of the American Revolution* (1865); *Life of Gen. Nathaniel Greene* (3 vols., 1865–76); *The German Element in the War of American Independence* (1876). The last is founded on Friedrich Kapp's researches, but the biography of Gen. Greene is a valuable work from original sources.

GREENE, Samuel Stillman (1810–1884), an American educator, was born at Belchertown, Mass., May 3, 1810. He graduated at Brown University in 1837, taught school and became superintendent of schools at Springfield, Mass., in 1840. In 1842 he removed to Boston, where he taught in the grammar and English high schools. In 1849 he was agent for the Massachusetts Board of Education. In 1851 he was appointed superintendent of the public schools, Providence, R. I., and was connected with Brown University. In 1855 he became professor of mathematics and civil-engineering in that institution, and in 1864 took the chair of astronomy, which he held till his death, in January, 1884. His chief publications were a series of English grammars, in which he directed special attention to the analysis of sentences.

GREENOUGH, Richard S., an American sculptor, was born at Jamaica Plain, Mass., April 27, 1819. He obtained some instruction in sculpture from S. V. Clevenger, and in 1840 went to Italy, where he studied with his brother, Horatio Greenough (for whom see the Encyclopædia Britannica). He soon returned to Boston, where he made portrait busts, but in 1850 went again to Italy, and worked on imaginative subjects in bronze and marble. He also made some statues, including Franklin and Winthrop. He resided in Paris from 1856 to 1868, and then removed to Newport, R. I.

GREENVILLE, a city of South Carolina, county-seat of Greenville county, at the junction of the Greenville and Columbia and the Richmond and Atlanta Railroads, 95 miles (143 by rail) N. W. of Columbia. It is picturesquely situated near Saluda Mountain, in the Blue Ridge, and is on the Reedy River, one of the head-streams of the Saluda. It has a court-house, a city-hall, a national bank, a daily and 2 weekly newspapers, and 7 churches; also a cotton-factory, oil-works, and manufactures of flour, furniture, and machinery. Greenville is the seat of Furman University and Greenville Female College (both Baptist institutions). It is a favorite summer resort. It is lighted with gas. Its property is valued at $1,800,000, and its public debt is $5100. It was settled about 1785, and in 1871 became a city. Population in 1870, 2757; in 1880, 6160.

GREENWOOD, Francis William Pitt (1797–1843), an American clergyman, was born at Boston, Mass., Feb. 5, 1797. Graduating at Harvard College in 1814, he studied theology with Rev. Henry Ware. In October, 1818, he became pastor of the new South Church, Boston, but was compelled to desist from preaching a year later. He then went to England, and on his return settled in Baltimore until 1824, when he became colleague to Rev. Dr. James Freeman, pastor of King's Chapel, Boston, under whom he had received his early training, and in 1827 became sole pastor. After his return from a voyage to Cuba in 1837 he published *Sermons of Consolation* (1842). He died at Boston, Aug. 2, 1843. He published a *History of King's Chapel* (1833); *Lives of the Twelve Apostles* (1838), and many sermons. His interest in the natural sciences, especially botany and conchology, was shown by contributions to the *Journal of Natural History* and other periodicals.

GREGG, David McMurtrie, an American general, was born at Huntingdon, Pa., April 10, 1833. He graduated at West Point in 1855, and served against the Indians in Oregon in 1858–60. At the outbreak of the civil war he was made captain in the Sixth cavalry, and in January, 1862, became colonel of the Eighth Pennsylvania cavalry. He served with distinction in the Virginia Peninsular campaign, and was made brigadier-general of volunteers on Nov. 29, 1862. He commanded a division of cavalry from this time and was engaged at Gettysburg and other important battles. He commanded the Second cavalry division from April 6, 1864, and was engaged in the Richmond campaign until his resignation, Feb. 3, 1865. Since that time he has been a farmer at Milford, Del.

GREGG, John Irvin, an American general, was born at Bellefonte, Pa., in 1825. He was made a lieutenant in the U. S. army in 1847 and served in the Mexican war. At the outbreak of the civil war he was made captain in the Sixth U. S. cavalry, and served till the close of McClellan's campaign in 1862. He was then made colonel of the Sixteenth Pennsylvania volunteers, and in 1863 had command of a cavalry brigade. He fought at Gettysburg and throughout Grant's Richmond campaign, but was taken prisoner April 6, 1865. He received various brevets for gallantry, and in 1866 was made colonel of the Eighth U. S. cavalry.

GREGG, Maxcy (1814–1862), a Confederate general, was born at Columbia, S. C., in 1814, his father being an eminent lawyer of that city. He graduated at South Carolina College in 1836, and was admitted to the bar in 1839. He was appointed major of the Twelfth infantry in March, 1847, and served till the close of the Mexican war. He was afterwards colonel of a regiment of State militia, and in 1860 was a prominent member of the State convention and helped to prepare the ordinance of secession. In the civil war he was colonel of the First South Carolina regiment, and in 1861 was made brigadier-general. He was killed at the battle of Fredericksburg, Dec. 13, 1862. At the time of his death he was governor-elect of South Carolina.

GREGOROVIUS, Ferdinand, a German historian, was born at Neidenburg, Jan. 19, 1821. He was educated at Gumbinnen and at the University of Königsberg, where he studied theology and philosophy. He afterwards devoted himself to literature, his first noted wor kbeing *Goethe's Wilhelm Meister in seinem sozialistischen Elementen* (1849). He also wrote some essays on Poland and Polish songs. In 1851 appeared his drama, *Der Todt des Tiberius*, and close after it his first historical work which he has since greatly improved and reconstructed under the title, *Der Kaiser Hadrian* (1884). In 1852 Gregorovius left Königsberg and went to Italy. His books of travel, beginning with *Corsica* (1854) and continued in five volumes of *Wanderjahre in Italien*, are valuable contributions to knowledge. Pompeii was the scene of his hexameter epic *Euphorion* (1858), which has found favor with the book-illustrators. His great historical work is *Die Geschichte der Stadt Rom im Mittelalter* (8 vols., 1859–72: 3d ed., 1875–82). It is founded on thorough study of original documents in Italy and Germany, and has shed abundant light on many obscure passages in mediæval history. For the sake of his work the author has received the freedom of the city of Rome, being the first Protestant so honored. In connection with his main work he has issued *Die Grabdenkmäler der Päpste* (1857; 2d ed., 1881). He has also published a life of *Lucrezia Borgia* (1874), which has passed through several editions, and has edited the *Letters* of Alexander von Humboldt to his brother Wilhelm (1880). Gregorovius resides alternately in Rome and Munich, and is active in the learned societies of both cities. Besides the works here mentioned he has published several poems and minor historical works.

GREGORY, Daniel Seely, an American clergyman and educator, was born at Carmel, Putnam co., N. Y., Aug. 21, 1832. He graduated at Princeton College in 1857 and studied theology at the Princeton Seminary, and during part of his course was instructor in rhetoric and English literature in the college. In 1860 he became pastor of a Presbyterian church at Galena, Ill., and he afterwards had charge of churches in Troy, N. Y., and New Haven, Conn. Compelled to retire from pastoral work in 1869 he recruited his health by farming, and in 1871 he became professor of mental sciences in Wooster University, Ohio, whence in 1878 he was called to be president of Lake Forest University, Ill. He has published *Christian Ethics* (1875); *Why Four Gospels?* (1877); *Practical Logic* (1881).

GRELLET, Stephen (1773–1855), a Quaker missionary, was born in France in 1773. He was educated at the military school at Lyons, and in 1790 entered the body-guard of Louis XVI. After the execution of the king, he went to Demerara and thence to New York in 1795. Here he attended a Quaker meeting and was so impressed with that mode of worship that he joined the society. He settled in Philadelphia and was active in benevolent work, especially in the yellow fever epidemic of 1798. He afterwards became a merchant in New York, but in 1800 began to make extended missionary tours in the United States, and in 1807 went to France for the same purpose. In 1818 he travelled over the greater part of Europe and addressed both the Pope and the Czar of Russia. In 1834 he retired to Burlington, N. J., where he died, Nov. 16, 1855. His *Memoirs* were published by B. Seebohm (1868), and other biographies have been issued.

GRÉVY, François Paul Jules, a French statesman, was born at Mont-sous-Vaudray, in the Jura, Aug. 5, 1813. The son of a Republican farmer, he was educated at the colleges of Poligny and Besançon, and at Paris. He is said to have fought in the streets of Paris in the Revolution of 1830, but thereafter devoted himself to the study of law, and soon attained an extensive practice. By courageous defence of Republican journalists he obtained also a political reputation, and in 1848 was sent by the provisional government to the Jura to inaugurate the new régime. Being then elected to the Constitutional Assembly from his native district, he was chosen one of the vice-presidents of the Assembly. Dreading the election of Louis Napoleon to the presidency of the Republic, he opposed the plan of choosing a president for four years by universal suffrage, and proposed that the executive power should be intrusted to the president of a ministry, elected by ballot by the Assembly, and liable to be removed in the same way. His project was defeated, and when the Second Empire was established M. Grévy was arrested and imprisoned for months on account of the speeches he had made against Napoleon's presidency. Retiring then to his profession, he held no political position until 1868, when he was again elected to the legislature from the Jura district. On the downfall of the Empire in September, 1870, when the new Republican leaders dissolved the Assembly, Grévy joined in the protest against their action. During the German war he pursued a moderate course, and in 1871 was almost unanimously chosen president of the Assembly. By his impartiality and firmness he did much to prevent outbreaks in that turbulent Assembly, but on April 1, 1873, when some members of the Right protested against one of his decisions, he resigned his place, and though re-elected almost unanimously still refused to take the position. After the retirement of Pres. Thiers, M. Grévy voted constantly with the Left, and opposed the septennate of Marshal MacMahon. He refused to vote for the constitution of 1875, on the ground that the Assembly had no power to make a constitution; he also refused to be a candidate for the Senate, believing that there should be but one legislative chamber. In February, 1876, he was again made president of the Chamber of Deputies. The position was rendered unusually difficult by the religious questions brought before the Chamber, but the president maintained his accustomed impartiality. The Senate, however, had a monarchical majority, and Pres. MacMahon, having forced M. Jules Simon out of the cabinet, called the Duc de Broglie to his place, and prorogued the Chambers for a month, in spite of the protest of 363 delegates against this unconstitutional step. In June the Senate agreed to a dissolution of the Assembly, and in the ensuing election the scheme of the president was defeated. M. Thiers, to whom all sections of the Republican party looked as their choice for president, died on Sept. 4, and M. Grévy, who was the chief speaker at his obsequies, was designated by Victor Hugo and Gambetta as his successor in the electoral district of Paris, and as the future president. Marshal MacMahon, however, continued to hold his place, making such changes in his ministry as he found unavoidable, until Jan. 30, 1879, when he resigned rather than remove some Bonapartist generals. On the same day M. Grévy was elected president for seven years. At this time also the new president received the grand cross of the Legion of Honor, having previously refused any decoration. Pres. Grévy's first cabinet was entirely composed of members of the Left, Waddington being the chief, but Gambetta was the ruling spirit, and, as the progress of events demanded, Waddington was replaced by Freycinet, a friend of Gambetta, in December, 1879, and he, in September, 1880, by Jules Ferry. Fourteen months later Gambetta himself took the responsible position of chief minister, with the portfolio of foreign affairs, but relinquished it in the following January. Up to this time much had been done to secularize education, and on March 30, 1880, Pres. Grévy issued a proclamation ordering the "so-called Society of Jesus" to disband. The Jesuit establishments were closed July 1, and later in the year other unauthorized religious orders were expelled from their cloisters. The military spirit of the French was soon gratified by the campaign against Tunis, which, though more expensive and less glorious than had been expected, resulted in the establishment of a protectorate over that country. In other parts of the world—in

Syria, in Madagascar, and especially in Tonquin—a French aggressive policy was manifested, but without results commensurate with the outlay. The yearly expenditure of the Republic has been enormous, exceeding even that of Great Britain, yet the budget steadily shows an excess of receipts; the national debt has been diminished, and the people have been prosperous. The Cobden treaty with England having expired in 1881, was not renewed, and the policy of protection has since prevailed. On Dec. 28, 1885, M. Grévy was re-elected president of France, by the joint vote of the Senate and Chamber of Deputies. His faithful execution of the will of the people, as expressed by the Assembly, and the republican simplicity of his manner of life, both tended to this result.

GRIERSON, Benjamin H., an American general, was born at Pittsburg, Pa., July, 1837. In early life he removed to Ohio, and he was afterwards engaged as a produce-dealer at Jacksonville, Ill. At the outbreak of the civil war he served on the staff of Gen. B. M. Prentiss, in Missouri. He was major of the Sixth Illinois cavalry, and became colonel March 28, 1862. In December, 1862, he had command of a cavalry brigade, and was engaged in many raids in Tennessee and Mississippi. To facilitate Gen. Grant's operations against Vicksburg, he made a noted raid from La Grange to Baton Rouge, lasting from April 17 to May 2, 1863. He was then made brigadier-general of volunteers, and at the close of the war was major-general. In July, 1866, he was appointed colonel of the Tenth U. S. cavalry.

GRIFFIN, Charles (1826–1867), an American general, was born in Licking co., Ohio, in 1826. He graduated at West Point in 1847, and entered the artillery service. At the outbreak of the civil war he was made captain of the Fifth artillery, and he fought bravely in the battle of Bull Run. He afterwards served with distinction in McClellan's Peninsular campaign, but after Gen. Pope took command was charged with refraining from taking part in the second battle of Bull Run, Aug. 28, 1862. Though arrested for trial on this charge, he was released to join Gen. McClellan in the Maryland campaign, and fought bravely at Antietam. In December he was placed in command of a division, and fought under Burnside, Hooker, and Meade. After Gen. Grant took command of the Army of the Potomac, Gen. Griffin shared in all the engagements from the Wilderness to the Five Forks, April 1, 1865, where he was made commander of the Fifth corps. His commission as major-general of volunteers dated from this battle, and a week later he received the arms and colors of Gen. Lee's army on its surrender. In July, 1866, he was made colonel of the Thirty-fifth infantry, and in the winter following he took command of the department of Texas. He died at Galveston, Texas, Sept. 15, 1867.

GRIFFIN, Edward Dorr (1770–1837), an American clergyman, was born at East Haddam, Conn., Jan. 6, 1770. He graduated at Yale College in 1790, was licensed to preach in 1792, and held pastorates at Hartford, Conn. (1795–1800), and Newark, N. J. (1801–09). He had acquired fame as a pulpit orator, and in 1809 was made professor of sacred rhetoric at Andover Theological Seminary. In 1811 he returned to pastoral work in Boston, and in 1815 removed to his former charge at Newark. From 1821 to 1836 he was president of Williams College, and labored successfully in its behalf. He died at Newark, N. J., Nov. 8, 1837. He published many sermons, but his most noted work was the *Park Street Lectures* (1813), in which he expounded the Calvinistic system of divinity. Rev. W. B. Sprague edited two volumes of his sermons, with a memoir (1838).

GRIFFIS, William Elliot, an American educator, was born at Philadelphia, Pa., Sept. 17, 1843. After graduating at the High School of that city in 1859, he spent six years in business pursuits, and then went to Rutgers College, where he graduated in 1869. In the next year he went to Japan to organize schools on the American plan, and for three years was professor of natural science in the Imperial University of Tokio. Returning to the United States, he studied theology at the Union Theological Seminary in 1877, and was ordained pastor of the First Reformed Church, Schenectady, N. Y. Besides some educational works prepared in Japan, and numerous contributions to magazines, reviews, and works of reference, he has published *The Mikado's Empire* (1876; 4th ed., 1884); *Japanese Fairy World* (1880); *Corea, the Hermit Nation* (1882); *Corea, Without and Within* (1884).

GRIMES, James Wilson (1816–1872), an American statesman, was born at Deering, N. H., Oct. 20, 1816. He graduated at Dartmouth College in 1835, having already commenced the study of law. He removed to Burlington, Iowa, then in the Territory of Michigan, and became eminent in his profession. He served in the territorial legislature of Iowa in 1838, and afterwards in the State legislature. He belonged to the Whig party, and in 1854 was elected governor of Iowa by a combination of this party with the Free Soil Democrats. During his term he assisted in providing better treatment for the insane, and promoted the construction of railroads in the State. He also contributed to the organization of the Republican party, and in 1858 he was elected to the U. S. Senate. Here he was a prominent member of the committee on the navy, and first suggested the introduction of iron-clad vessels in July, 1861. He was re-elected to the Senate in 1864, and in his second term was conspicuous as one of the few Republicans who refused to sustain the impeachment of Pres. Johnson. During the impeachment trial Senator Grimes was stricken with paralysis, but he continued to discharge the duties of his office until 1869, when he resigned and made a protracted tour in Europe. He died at Burlington, Iowa, Feb. 7, 1872.

GRIMKÉ, Thomas Smith (1786–1834), an American lawyer, was born at Charleston, S. C., Sept. 26, 1786. He was the son of John Fancheraud Grimké (d. 1819), who had been a colonel in the Revolutionary army, and was afterwards a judge of the Supreme Court of South Carolina. Thomas graduated at Yale College in 1807, studied law at Charleston, and became eminent in his profession. In the State senate in 1828 he made an able speech, sustaining the national government in the tariff dispute. His most noted legal argument was that on the constitutionality of the South Carolina test oath in 1834. He was a prominent member of the American Peace Society, and earnestly opposed all war, even defensive. He also made addresses on various subjects pertaining to temperance, education, and literature, and attempted to introduce a new system of English spelling. (See Duyckinck's *Cyclopædia of American Literature*, Vol. I., p. 779.) He died near Columbus, Ohio, Oct. 12, 1834. A volume of his addresses was published at New Haven in 1831.

His sister, Sarah Moore Grimké (1792–1873), was born at Charleston, S. C., Nov. 6, 1792. From early youth she showed her dislike to slavery, and having inherited some slaves she set them free. In 1821 she removed to Philadelphia, where she joined the Society of Friends. In 1828 she published *An Epistle to the Clergy of the Southern States*, an efficient anti-slavery document. She and her sister Angelina began to lecture against slavery in 1836, and Sarah wrote for Garrison's *Liberator* letters on *The Equality of the Sexes*, which were also published in book-form. After her sister's marriage to Theodore D. Weld, Sarah resided with them and taught in their school, established at Belleville, N. J., in 1840, and afterwards moved to other places. She died at Hyde Park, N. Y., Dec. 23, 1873. She published some translations from the French.

GRINNELL, Henry (1790–1874), an American merchant, was born at New Bedford, Mass., Feb. 13,

1799. He was brought up to mercantile pursuits and removing to New York was for thirty years engaged in the whale-oil business. Afterwards he was interested in insurance companies and savings banks. In 1850 he fitted out the Grinnell expedition sent in search of Sir John Franklin. He was the first president of the American Geographical Society. He died at New York, in June, 1874.

GRINNELL, Moses H. (1803–1877), an American merchant, brother of the preceding, was born at New Bedford, Mass., March 3, 1803. He was associated in business with his brother, and in 1853 actively promoted Dr. E. K. Kane's Arctic expedition. He had been a member of Congress 1839–41, and in 1869 was appointed by Pres. Grant collector of the port of New York. He died at New York, Nov. 24, 1877.

GRISCOM, John Hoskins (1809–1874), an American physician, was born at New York, Aug. 13, 1809. He was the son of John Griscom (1774–1852), a member of the Society of Friends, noted for his labors in behalf of education in New Jersey, Providence, and New York. John H. Griscom studied medicine at Rutgers Medical College, New York, and at the University of Pennsylvania, where he graduated in 1832. He then became connected with the New York Dispensary and was professor of chemistry in the New York College of Pharmacy, 1836–40; physician to the New York Hospital, 1843–67; and general agent of the commissioners of immigration, 1848–51. He gave much attention to sanitary and hygienic subjects. He died at New York, April 28, 1874. His works include *Animal Mechanism and Physiology* (1839); *Sanitary Condition of the Laboring Classes of New York* (1844); *Uses and Abuses of Air* (1850); *History of the Yellow Fever in New York* (1858); *Sanitary Legislation* (1861); *Use of Tobacco* (1868); and a *Memoir* of his father (1859).

GRISWOLD, Alexander Viets (1766–1843), an American bishop, was born at Simsbury, Conn., April 22, 1766. He was educated by his uncle, Rev. Roger Viets, who was rector of that parish until 1787, when he went to Nova Scotia. Griswold was ordained June 3, 1795, and ministered in several churches until 1804, when he became rector of St. Michael's Church at Bristol, R. I., and taught a school. When the Eastern diocese was formed, comprising all New England except Connecticut, he was elected bishop and was consecrated by Bishop White, May 29, 1811. He still held the rectorship of the church in Bristol until 1830, when he went to Salem, Mass., and a few years later he removed to Boston. His last public act was, Dec. 29, 1842, to consecrate Rev. Dr. M. Eastburn, who had been chosen his assistant. He died at Boston, Mass., Feb. 15, 1843. His only publications were sermons and addresses. His *Life* was published by Rev. J. S. Stone, D. D.

GRISWOLD, Rufus Wilmot (1815–1857), an American author, was born at Benson, Rutland co., Vt., Feb. 15, 1815. His early life was spent in voyaging about the world, and before he was twenty he had seen the most interesting parts of America and Europe. He then studied divinity and became a Baptist preacher, but soon turned his attention to journalism. He was connected editorially with weekly newspapers in New York, Boston, and Philadelphia. In 1842–43, as editor of *Graham's Magazine*, he did much to develop American authorship. Of his *International Monthly Magazine* five volumes were issued. He is chiefly known by his collections called *Poets and Poetry of America* (1842); *Prose Writers of America* (1846); *Female Poets of America* (1849). These exhibitions of the literature of this country with his accompanying criticisms had an important influence on its development, and on the reputation of the various authors included. They have passed through many editions and have been revised and enlarged by various editors. Griswold prepared similar volumes on the *Poets and Poetry of England in the Nineteenth Century* and *Sacred Poets of England and America*. Besides popular biographies of *Washington and the Generals of the American Revolution* (1847) and *Napoleon and the Marshals of the Empire* (1847) he published *The Republican Court, or American Society in the Days of Washington* (1854). He was a diligent investigator of American history and literature, and did much to improve and diffuse literary taste among the people. He died at New York city, Aug. 27, 1857. Griswold was Edgar A. Poe's literary executor and took advantage of this position to assail Poe's character in a manner which has roused partisans in defence of the latter.

GROSS, Samuel D. (1805–1884), an American surgeon, was born near Easton, Pa., July 8, 1805. After receiving an academic education he studied medicine and graduated at Jefferson Medical College, Philadelphia, 1828. He commenced practice in that city, and being a hard worker devoted much time to translating French and German medical works. His first important work was *Diseases and Injuries of the Bones and Joints* (1830). In 1833 he was appointed demonstrator of anatomy in the Ohio Medical College in Cincinnati, and in 1835 became professor of pathological anatomy in the medical department of Cincinnati College, delivering the first systematic course of lectures on morbid anatomy ever given in the United States. From the lectures delivered here he composed his *Elements of Pathological Anatomy*, the first American treatise on the subject. In 1839 Dr. Gross was appointed professor of surgery in the University of Louisville, Ky. In 1850 he was called to a similar position in the University of New York, but after holding this chair for one year he returned to Louisville. Here he founded and was first president of the Kentucky State Medical Society. In 1856 he was made professor of surgery in Jefferson Medical College and held this position until 1882, when he resigned and was made professor emeritus. He has been a diligent student and voluminous author. His most important work was his *System of Surgery*, which first appeared in 1859 and has since passed through six editions. It has been pronounced the most elaborate work on surgery ever written by one man. Among his later works were *Manual of Military Surgery* (1862); *Practical Treatise on Foreign Bodies in the Air Passages* (1850); *Diseases of the Urinary Organs* (1851); *American Medical Biography* (1861); *History of American Medical Literature*; and *History of the Progress of American Surgery during the last Century*. He was a member of the American Philosophical Society, and of numerous medical societies in all parts of the world. In 1868 the American Medical Association elected him its president. He was also twice a delegate to the British Medical Association, and was unanimously elected president of the International Medical Congress at Philadelphia in 1876. He received the degree of LL. D. from Jefferson College, and in 1872 the degree of D. C. L. from the University of Oxford, and a few days before his death the University of Edinburgh conferred on him the degree of LL. D. He died at Philadelphia, May 6, 1884, having continued at work till a month previous. For forty-eight years he was engaged in the public teaching of surgery. He was noted for his conscientiousness in the discharge of his duty to his patients and his pupils. As an operator he held the foremost rank, being clear in his diagnosis, quick in taking the proper course of treatment, and always cool and self-possessed.

GROVE, George, an English author, was born at Clapham in 1820. He became a civil-engineer, and erected the first cast-iron light-house ever built, on Morant Point, Jamaica, in 1841. He also erected a similar one on Gibbs' Hill, Bermuda. He was afterwards employed by Robert Stephenson on the Holyhead Railway and the Britannia Bridge. In 1850 he became secretary of the Society of Arts, and in 1852 secretary of the London Crystal Palace Company, which position he held till 1873. For several years he was editor of *MacMillan's Magazine*. His most important work is his *Dictionary of Music and Musicians* (4 vols., 1830–86).

GROVE, Sir William Robert, an English physicist, was born at Swansea, July 11, 1811. He was educated at Brasenose College, Oxford, graduating in 1830. He was admitted to the bar in 1835; but, having given much attention to the study of electricity, he invented in 1839 a powerful voltaic battery. From 1840 to 1847 he was professor of experimental philosophy at the London Institution. Having resumed the practice of law he became queen's counsel in 1853, and was the leader of the South Wales and Chester circuits. In 1871 he was made justice of the Common Pleas, and soon after received the honor of knighthood. He had continued to prosecute his electrical researches, and in 1866 was president of the British Association at Nottingham. He has made many noteworthy discoveries, but his fame is derived chiefly from the doctrine of the correlation of physical forces, first stated in 1842, and more fully developed in 1846.

GRUNDY, Felix (1777–1840), an American statesman, was born in Berkeley county, Va., Sept. 11, 1777. His father removed to Kentucky in 1780, and Felix was educated at Bardstown Academy. He studied law, and having begun practice in 1798 became noted as an advocate, especially in criminal cases. In 1799 he was a member of the Kentucky Constitutional Convention and in 1800 was elected to the legislature. In 1806 he was appointed judge in the State Supreme Court, and soon after chief-justice. In 1808 he removed to Nashville, Tenn., where he took a high position at the bar. In 1811 he was elected to Congress and during two terms supported Madison's administration. In 1815 he declined to be made candidate, but in 1829 he was elected to the U. S. Senate. In 1838 Pres. Van Buren appointed him attorney-general of the United States, but in 1840 he was re-elected to the Senate. He died at Nashville, Dec. 19, 1840.

See Vol. XI. p. 209 Am. ed. (p. 236 Edin. ed.).

GUARANTY. An undertaking on the part of a person to pay a debt, or perform a duty, upon the failure of another who is in the first instance liable. The English Statute of Frauds, 29 Charles II., c. 3, sect. 4, enacted that such an agreement, to be binding, must be in writing and signed by the party to be charged therewith, or by some other person thereunto by him lawfully authorized; and this statute has been adopted or substantially re-enacted throughout the United States.

There have been numerous distinctions made under this statute. Where the principal obligation is void by reason of the debtor's incapacity to contract, and this is contemplated by the parties; in such a case the statute does not operate, and the agreement on the part of a third person to answer for such obligation would be enforceable though not in writing and signed. But it seems that if the invalidity of the principal obligation is not contemplated by the parties the case falls within the statute, and the agreement of the third party must be in writing and signed. If a creditor discharge a debtor from liability upon the strength of a promise by a third party to pay the debt such a promise is valid though not in writing. So also where the promissor or guarantor has property in hands belonging to the debtor in consideration of which he promises to pay the debt, or acquires or is benefited by a lien which the creditor had, he is bound although no writing pass. Where exclusive credit is given to the promissor this is treated as an *original* contract, and, of course, does not fall within the statute of frauds; that is to say, the fulfilment of an *original* obligation must be guaranteed by *another* person not the original obligor, in order that the case may be within the statute: in the language of the courts the contract of guaranty must be *collateral*. But if it be collateral only in form and original in substance, the law looks to the substance rather than the form, the question being whose debt is promised to be paid, and not what is the form of the contract.

GUARDIAN. A person having charge, in law, of the person and estate, or either, of a minor. The father is considered, in the first instance, as the guardian *by nature and for nurture* of all his children during minority, and, after him, the mother. The courts will enforce the father's right to the custody of the child as against the claim of the mother; but, if the father be incapable, or unfit for the charge, it will be awarded to the mother; and, in this country, the mother will be awarded the guardianship of a bastard against the claim of its putative father. Guardianship *by nature and for nurture* extends only over the person, and not the estate, of the child. Hence, a mere natural guardian cannot give a valid receipt for a legacy paid him for the child.

By statute 12 Charles II., a father was given power to appoint a guardian for his children during minority, by will. Such a guardian is called a *statutory* or *testamentary* guardian. The English statute has been extensively adopted in this country, and in some States the mother has testamentary powers in respect to the appointment of a guardian. In the absence of a guardian, or in the event of the disability or refusal of a guardian to act, the court of Chancery in England has long exercised the power of appointing a suitable guardian. But the appointment of guardians is generally covered by statute in this country, and, where occasion requires, guardians are generally assigned by probate or other courts, under statutory powers, the chancery courts in some States retaining a general supervision.

If there is no father or mother, the guardian is entitled to the custody of the child. A parent must support his child from his own means, in return for which the child's services belong to him; but a guardian need not supply the wants of his ward except from the latter's own estate; nor is he entitled to the ward's services. The ward must be maintained in a style suitable to his condition in life, but not beyond his means. It is the duty of the guardian to superintend his education, and in general to supply the place of a judicious parent. In managing the ward's property, the following is a summary of the guardian's powers and duties: "To collect all dues and give receipts for the same; to procure such legacies and distributive shares from testators or others as may have accrued; to take and hold all property settled upon the ward by way of gift or purchase, unless some trustee is interposed; to collect dividends and interest, and the income of personal property in general; to receive and receipt for the rents and profits of real estate; to receive moneys due the ward on bond and mortgage; to pay the necessary expenses of the ward's personal protection, education, and support; to invest and reinvest all balances in his hands; to sell the capital of the ward's property, change the character of investments when needful, convert real into personal and personal into real estate, in a suitable exigency, but *not without judicial direction;* to account to the ward, or his legal representatives, at the expiration of his trust."

Guardianship is ended as follows: When the ward, on arriving at fourteen, elects, under the statute, another guardian, and the latter is appointed; when the ward has reached majority; on the expiration of the time limited by testamentary appointment; on the death of the ward, in which case the guardian has simply to settle up his accounts and pay the balance in hand to the ward's representatives, and his trust is ended. On the marriage of the ward, the guardianship ends in so far as it relates to the person. In the case of a male ward, it still continues over his estate until he becomes of age. In case of a female ward, the question is not settled. Guardianship is also terminated upon the death or resignation of the guardian, or upon removal by the court, for cause shown.

GUELPH, a city of Ontario, Canada, county-seat of Wellington county, beautifully situated on the river Speed, which flows through the town. It is on the main line of the Grand Trunk Railway at the junction of 2 branch lines, 45 miles W. S. W. of Toronto. The town is well built and has 6 banks, 2 daily and 2 weekly newspapers, several handsome churches, the county buildings, a high-school, the Ontario Agricultural College, a convent, 5 flour-mills, manufactures of sewing-machines, woollen goods, musical instruments, carpets, carriages, castings, soap, farm-implements, etc., the river affording ample water-power. A large proportion of the buildings are constructed of a handsome white stone, quarried near by. The town is lighted with gas, has water-works and a public park. The total valuation is $3,101,880. Guelph was founded in 1827, and incorporated a city in 1878. Population in 1881 was 9890.

GUERICKE, Heinrich Ernst Ferdinand (1803–1878), a German theologian, was born at Wettin, Feb. 25, 1803. He studied theology at Halle, where in 1829 he became professor extraordinary. But he strenuously resisted the union of the Lutheran and Reformed Churches of Prussia in 1833, and was ordained pastor of a congregation of Lutheran dissentients. His professorship was then taken from him, but in 1840 it was restored. He then founded a religious journal which he conducted until his death, Feb. 4, 1878. Among his writings are *August Herman Franke* (1827); *Neu-Testamentliche Isagogik* (1854; enlarged from a work published in 1843); *Handbuch der Kirchengeschichte* (2 vols., 1833; 9th ed., 1866–67, translated by Rev. W. G. T. Shedd, 1857–63); *Allgemeine Christliche Symbolik* (1839; 3d ed., 1861); *Lehrbuch der Christlichen Archäologie* (1847; 2d ed., 1859; translated into English, 1851).

GUERRERO, Vicente (*c.* 1770–1831) president of Mexico, was a creole mulatto, born at Tixtla about 1770. Being a slave he took part in an insurrection in 1809. In 1818 he became a leader of the liberal troops, and in 1827 was the candidate of the *Yorkino* party for president, but was not elected. War ensued, and in 1829 he was declared president, and when a Spanish invasion occurred he was made dictator. After the defeat of the invaders he showed unwillingness to resign his power, and Vice-Pres. Bustamente marched against him. Guerrero, deserted by his troops, resigned, but a few months later gathered a new force, and was captured and shot at Cailapa, Feb. 14, 1831.

GUESS, George, also called Sequoyah (*c.* 1770–1843), a Cherokee half-breed, inventor of the Cherokee alphabet, was born about 1770. He occupied a farm in Northern Georgia, and was an ingenious silversmith. Knowing no language but his own, he took the letters found in the English spelling-book as the basis of a syllabic alphabet, which finally had 85 characters. Newspapers and books were afterwards printed in Cherokee with these characters. When his tribe was driven from their possessions, he went with them beyond the Mississippi. He died at San Fernando, in Northern Mexico, in August, 1843.

GUINEA-FOWL. See Fowl.

GULF-WEED, SARGASSO-WEED, in botany *Sargassum bacciferum.* Columbus, in his voyage of discovery, entered on Sept. 15, 1492, an immense plain of sea-weed, in that part of the Atlantic which has been called the Sargasso Sea. Where the plant came from no one knew, and it is not a little remarkable that now, 400 years after, we know but little more of its origin than was known in Columbus' time. Sea-weeds derive all their nourishment from the water which surrounds them. Their attachment to rocks or other objects is for the mere purpose of location. They derive no food from the connection. But this sea-weed has never been found attached anywhere, and some botanists have come to believe that it can exist indefinitely as a floating weed, increasing by bud development and without the agency of sexual products. As, however, there must be a perpetual flow of cold and heavy water to take the place of the water lightened by the tropical sun, and hence a steady stream of water on the surface towards the Arctic Seas to take the place of the heavier waters rolling southward, it is believed that the whole of this floating mass of sea-weed would eventually disappear along the lines of the Gulf Stream, unless there were a fixed source of supply in some tropical location. This is probably in deep water, the exact place as yet undetermined. The weed is usually found in more or less abundance between 20° and 45° N. lat. The true Gulf-weed is *Sargassum bacciferum*, but there are several allied species, some of which have been used as food. In South America the Gulf-weed is used as a remedy in tumors, though some medical men believe that whatever merit it has is simply due to the iodine it contains. Forchammer analyzed the ashes of *Sargassum cocciferum*, and found them to contain of potash 0.09, soda 0.81, magnesia 0.68, lime 5.69, phosphoric acid 0.38, sulphuric acid 2.22, silica 0.19. The total percentage of ash was 11.62. (T. M.)

GUM-PLANT (*Grindelia robusta*). *Grindelia* was named by Willdenow, in 1807, in honor of Dr. Grindel, a German botanist. It is exclusively an American genus, inhabiting the dryer regions of the continent west of the Mississippi, its range extending to the Pacific coast. Some species are found as far north as the Saskatchawan in the British possessions, while Patagonia seems to be the limit on the south. The chief home of the genus seems to be in Texas and Mexico. The genus belongs to the section *Asteroideæ* of the natural order *Compositæ.* It is easily recognized. It differs from other genera in having a pappus composed of from 2 to 8 rigid, horn-like awns, which are early deciduous. The leaves are thickish, and in most species covered by a viscid exudation, and in some instances have a marked tendency to present their edges at a right angle with the horizon. Though so natural a genus, the species are so closely related that there is much difficulty in placing them. California has about 4 recognized species, and one of these, *Grindelia robusta*, is the special one known popularly as the "Gum-Plant" by Californians. It has achieved great popularity in medicine as a remedy in a variety of diseases, concerning the efficiency of which Prof. J. T. Rothrock announces himself as skeptical. It is regarded especially as a remedy for poisoning by the *Rhus diversiloba*, the poison-oak of California. It takes on a number of forms which have been described as species by some botanists, and failure to derive the anticipated benefits from its use has sometimes been charged to employing the wrong variety. (T. M.)

GUM-TREE, a name popularly applied, in various English-speaking countries, to a number of exceedingly diverse kinds of trees. In Australia and Tasmania the Eucalypti are known as gum-trees. The *Bursera gummifera*, or cachiboo gum (order *Amyridaceæ*), is a large tree of Southern Florida and the West Indies. Hog gum, doctor's gum, etc., are trees (or gummy products of trees) of the British West Indies, the names being vaguely and variously applied. A species of wild *Ficus* is locally called gum-tree in South Florida. But the trees generally known as gum-tree in the United States are the following:

I. Sour gum, *Black gum*, *Tupelo*, *Peperidge*, are names belonging to trees of the genus *Nyssa*, and order *Cornaceæ*, and which, with the genus *Cornus*—the Dogwoods—constitute the chief portion of the order. They differ much from true Dogwoods in their general appearance, and in a more particular manner in the diœcious or monœcious character of their flowers; in *Cornus* there are but four stamens and four petals; in *Nyssa* there are in the male flower from five to twelve stamens and five petals, and in the female flowers the petals vary from two to five. The chief character would perhaps be the one-celled ovary in *Nyssa*, as against the two or three-celled one of *Cornus.* The various species of *Cornus* are seldom more than large shrubs, while the "Sour gums" (in all the species) are large trees, sometimes among the largest of the forest. They are peculiarly American, and confined to the seaboard of the Atlantic United States. The sour gum was first described by Catesby in his *History of the Carolinas* as a "tree growing in water." The characters are somewhat variable, and in the earlier days of American botany a number of species were distinguished, which in modern times have been reduced to three, namely, *Nyssa multiflora*, which includes all the northern forms, and which extends also south to the Gulf States; *N. uniflora*, which is found from North Carolina to Florida; and *N. capitata*, which grows from Georgia to Florida in swamps near the coast. The last is known as the Ogeechee Lime. The acid fruit evidently suggested the name of "sour gum," in distinction to sweet gum, the wood of the tree, by its intricate fibres, being so much like that of the sweet gum (*Liquidambar Styraciflua*) as to cause the two trees to be classed together by lumbermen, though so very different botanically. The interwoven fibres render the wood extremely difficult to split, and hence it is very valuable for rollers, blocks, and all work where lightness and toughness is desirable. It is the favorite wood for the hubs of wheels. For this purpose the tree is cut in the early part of the winter, the trunk divided into approved lengths, and stored away for two or three years, in the shade, to season. The tree usually grows from 30 to 50 feet high, and about 6 feet in circumference. The writer has measured some on the alluvial soil, known as "the meadows," below Philadelphia, 80 and 90 feet high, and 12 and 13 feet in circumference. As, however, the planks will not plane smooth, it is one of those rare cases in forestry where there is no especial advantage in a large tree. The sub-acid berries are acceptable to birds. In the autumn the leaves turn to a brilliant red, and give a magnificent glow to the American landscape. Some special attention was drawn to the sour gum in 1852, by the exhibition before the Paris Academy of Sciences, by M. Precul, of a part of a trunk brought from Louisiana, which had been deprived of its bark for 16 or 17 inches around its stem, near the ground, and yet made new wood and bark out of the old wood, connecting completely with the bark above and below the wound. It seemed to prove that new wood and bark were formed from the old, and that the cambium layer is but a gummy mucilage provided for the newly forming cells to feed on. But it is now known that a large number of trees, as well as the gum, will make wood and bark in this manner, if care be taken to keep the cambium layer from drying up.

II. Sweet gum, also called White gum and Bilsted (*Liquidambar Styraciflua*), is one of the most widely diffused of all the trees of the Atlantic slope of the American continent. It is found sparingly along the line of the Great Lakes, increasing in abundance southwardly to Mexico. The first knowledge Europeans had of it was from the writings of Monardes, a Spanish botanist, who wrote a treatise on Mexican plants. The Mexicans call it *Xochicotozo Quamitl*, according to early authors; and the gum which they prepare from the tree they call *copalm*. This name, according to Micheaux, was also prevalent in his time among the French along the Gulf. The botanical name adopted by Linnæus is evidently derived from the description of Plukenet, who describes it as "Liquidambari arbor seu Styraciflua." In early times the product of the storax of the East was known as "liquid" and "solid," and the product of this tree was classed with the former sort. The Eastern storax is the product of *Styrax officinale*, and was one of the ingredients in the sweet perfumes of the ancients. The gum of the American *Liquidambar* is of much wider utility. It was with the Indians a popular remedy in fevers, and was also employed in healing wounds. It appears from the researches of Dr. F. Peyre Porcher (*Resources of the Southern Fields and Forests*, Charleston, 1869) to have real merit. It is used in Mexico to relieve chronic catarrhs and similar complaints. In the South it is found to be a cordial and stomachic. "A decoction of the inner bark of the gum-tree in a quart of milk, or a tea made with boiling water, is one of the most valuable and useful mucilaginous astringents we possess. It can be employed with advantage in cases of diarrhœa and dysentery" (Porcher). Dr. Lindley remarks, in the *Vegetable Kingdom*, that the produce of *Liquidambar Styraciflua* abounds in benzoic acid; but Dr. Porcher says, "the acid is not benzoic, as the English assert, but cynanic." Michaux and others assert that the trees in the United States yield very little gum; and Dr. Griffith found that the greatest quantity is obtained from young trees, and just before the appearance of the leaves in spring. The gum is about the consistence of honey, of a yellow color, and of a pleasant balsamic taste. Rafinesque says the Cherokees used the gum as a drawing-plaster, and the Mexicans burn it as incense to make a sweet perfume. The name "Bilsted" is a corruption of "Byl-steel," which Dr. Cadwallader Colden, of New York, in an early catalogue of the plants of that State, says was the "name given to it by the Dutch in New York."

As a timber-tree the sweet gum is of little value where the wood is exposed to the weather. As firewood it ranks with poplar or cottonwood, which is about half the value of shell-bark hickory. But where it can be preserved dry, its toughness, lightness, and susceptibility to polish give it many advantages. In these respects it compares favorably with black walnut. It has been employed in buildings, in making coffins, picture-frames, bedsteads, and other furniture. It is much used in making small berry-baskets. It has some advantages over timber more generally useful, in this, that the tree will grow very rapidly in wet places where little else will grow well. In such places trees are sometimes found 12 feet in circumference. Its height is generally about 60 feet. It, however, grows very well on comparatively dry ground, if the soil be not too poor. It is very popular as an ornamental tree. The habit of growth is pleasant, and the lobed, star-like leaves turn to a beautiful crimson purple in the fall of the year. A singular corky excretion often covers the bark, and gives the branches a very picturesque appearance in the winter season. A species closely allied to the American was found growing in China, by Mr. Mavies, but it was not among the large collection of the woods of Japan exhibited at the American Centennial Exhibition. Another species, *Liquidambar imberbe*, is known to botanists, and credited to the Levant. *L. Altingia* grows in the far East.

The exact place of the *Liquidambar* in botanical classification has long been a puzzle to botanists. Dr. Gray refers it to *Hamameliaceæ*, the Witch-Hazel family. This gives three American genera to the order, *Hamamelis*, *Fothergilla*, and *Liquidambar*. From the other two it differs in having monœcious or polygamous flowers, which have no calyx or corolla, and the seed-pods are consolidated into a dense head. The seed-vessels are interesting from the enormous amount of abortive seeds they often contain, in comparison with the few perfect ones. (T. M.)

GÜNTHER, Albert Karl Ludwig Gotthilf, a German-British zoölogist, was born at Esslingen, Oct. 3, 1830. He was educated at Stuttgart, and studied theology at Tübingen, but afterwards medicine at Berlin and Bonn. In 1855 he obtained the degree of doctor of medicine at Tübingen. Removing then to London he became an assistant in the zoölogical department of the British Museum, and since 1875 has been director of that department. He has published many valuable catalogues and treatises, among which are *Colubrine Snakes* (1857); *Batrachia salientia* (1857); *Reptiles of British India* (1864); *Gigantic*

Land-Tortoises (1877); *Introduction to the Study of Fishes* (1880). From 1865 to 1870 he published an annual *Record of Zoölogical Literature*, which has since been issued by others.

GURLEY, Ralph Randolph (1797–1872), an American philanthropist, was born at Lebanon, Conn., May 26, 1797. He graduated at Yale College in 1818, and having settled at Washington, D. C., was licensed as a Presbyterian preacher. In 1822 he became an agent of the American Colonization Society, which position he held till his death. He made three visits to Africa to further the objects of the society, and assisted in organizing the government of Liberia. He also travelled through the United States, making addresses in behalf of the society and edited the *African Repository*, its organ. He prepared biographies of Jehudi Ashmun (1835) and Rev. Sylvester Larned (1844). He died at Washington, D. C., July 30, 1872.

GURNEY, Sir Goldworthy (1793–1875), an English inventor, was born in Cornwall in 1793. He studied medicine, but devoted himself to chemistry, and in 1822 delivered a course of lectures on this subject at the Surrey Institution. He invented the Bude, oil-gas, lime, and magnesium lights, and claimed to have invented the oxy-hydrogen blowpipe, and to have first observed the deflection of the magnetic needle by voltaic cross-currents. He invented the high-pressure steam-jet and the tubular boiler. In 1829 he drove a steam-carriage from London to Bath on a turnpike road, with a speed of 14 miles an hour. His high-pressure steam-jet was used to ventilate and extinguish fires in coal-mines, and to remove poisonous gases from sewers. In 1852 he had charge of the lighting and ventilating of the new Houses of Parliament, which he accomplished by an original method. He was knighted in 1863, but in the same year was paralyzed. He died at Reeds, Cornwall, Feb. 28, 1875.

GURNEY, Joseph John (1788–1847), an English philanthropist, was born at Earlham, near Norwich, Aug. 2, 1788. He was educated at Oxford without becoming a member of the University. In 1818 he became a minister in the Society of Friends, and with his sister, Mrs. Elizabeth Fry, took much interest in behalf of prisoners. He travelled extensively in Ireland, the United States, Canada, the West Indies, and on the continent of Europe, examining the condition of prisons, and prosecuting various benevolent enterprises. He was active in the movement of Clarkson and Wilberforce for the abolition of slavery and the slave-trade. He was also an earnest advocate of total abstinence. He died at Earlham, Jan. 4, 1847. Biographies of him were published by Bernard Barton (1847), by J. B. Braithwaite (1854), and by Hodgson (1856). His writings were numerous and include *Notes on Prison Discipline* (1819); *Religious Peculiarities of the Society of Friends* (1824); *Evidences of Christianity* (1827); *History, Authority, and Use of the Sabbath* (1831); *A Winter in the West Indies* (1840); *Thoughts on Habit and Discipline* (1844). A controversy arose in the United States in reference to his doctrinal views, which resulted in a secession of the Wilberites from the Orthodox Friends in 1843.

GUROWSKI, Adam, Count (1805–1866), a Polish-American author, was born at Rusocice in the Palatinate of Kalisz, Sept. 10, 1805. His father, Count Ladislas Gurowski, had lost most of his estates after the insurrection of 1794. Adam was expelled from school for revolutionary demonstrations, and for taking part in the insurrection of 1830 he was condemned to death and his estates confiscated. In Paris he became noted as a writer and agitator in behalf of Poland. But his work, *La vérité sur la Russie* (1835), proved so acceptable to the Russian government by its advocacy of Panslavism, that he was invited to St. Petersburg by the Czar, and employed in his private chancery. He was afterward in the department of public instruction, but in 1844 he went to Germany, and then for two years lectured on political economy in the University of Berne. After a year in Italy he came to the United States in 1849. He wrote for the *New York Tribune* and became deeply interested in American politics. During the civil war he resided in Washington, and was employed in the department of state. He died at Washington, May 4, 1866. His works published in Europe include *La civilisation et la Russie* (1840); *L'Avenir des Polonais* (1841); *Impressions et Souvenirs* (1846); *La Panslavisme* (1848). After he came to the United States he published *Russia as it is* (1854); *America and Europe* (1857); *Slavery in History* (1860); and *My Diary* (3 vols., 1862–66). The last work consisted of notes on the American civil war.

GUTHRIE, James (1792–1869), an American statesman, was born near Bardstown, Ky., Dec. 5, 1792. His father, Gen. Adam Guthrie, had emigrated from Virginia to Kentucky, where he fought with the Indians, and was a member of the legislature for several years. James, after receiving an academical education, became a trader on the Mississippi. Then studying law, he settled in Louisville in 1830 and acquired an extensive practice. He was a member of the State legislature for fifteen years, and was president of the State Constitutional Convention in 1850. He was called to be secretary of the treasury by Pres. Pierce in 1853, and held this position until 1857. When secession was agitated he was a firm friend of the Union, and helped to save Kentucky from joining the Southern Confederacy. In 1864 he was a delegate to the National Democratic Convention at Chicago. In 1865 he was elected to the U. S. Senate, but was compelled by ill health to resign his seat in February, 1866. He died at Louisville, Ky., March 13, 1869.

GUYOT, Arnold Henry (1807–1884), a Swiss-American geographer, was born near Neuchâtel, Switzerland, Sept. 28, 1807, and graduated at the University of Berlin in 1835. He studied theology as well as the natural and physical sciences. He was from 1839 to 1848 professor of history and physical geography in the Neuchâtel Academy, where Agassiz was associated with him. During this time he carried on extensive observations regarding the Alpine glaciers, and announced to the scientific world the laminated structure of glacial ice, and the motion of glaciers by molecular displacement. He also made important observations on boulder transportation by ice. With Agassiz and Desor he published in 1848 the first volume of the *Système Glaciaire.* In 1848 he removed to the United States, and for six years was employed as a lecturer on physical geography in the public schools and teachers' institutes in Massachusetts. In 1855 he became professor of geology and physical geography in the college at Princeton, N. J. Among his works are *The Earth and Man* (translated from the French by Prof. Felton, 1849); *Meteorological and Physical Tables* (1851–59); a series of school geographies and wall-maps; works on physical geography; and numerous reports and papers on hypsometry, meteorology, and other scientific subjects.

GWIN, William McKendry (1805–1885), an American politician, was born in Sumner co., Tenn., Oct. 9, 1805. He was educated at Transylvania University, Ky., studied medicine, and settled at Vicksburg, Miss. He was appointed U. S. marshal for Mississippi in 1833, and was elected to Congress in 1841. He was appointed to supervise the erection of the New Orleans custom-house in 1847. He removed to California in 1848, and in the next year was a member of the convention to frame the constitution of that State. He was elected to the U. S. Senate in 1850 and re-elected in 1856. Having advocated the secession of California in 1861 he was arrested for disloyalty, but was released in 1863. Towards the close of the civil war he was active in promoting a scheme for the settlement of Sonora with Confederates, and was reported to have accepted the title of Duke of Sonora from the Emperor Maximilian. He afterwards returned to the United States and lived in obscurity till his death at New York, Sept. 3, 1885.

GWINNETT, Button (c. 1732–1777), a signer of the American Declaration of Independence, was born in England about 1732. He emigrated to Charleston, S. C., in 1770, and after spending two years in trade, purchased land on St. Catharine's Island, Ga., where he devoted himself to agriculture. He was elected a delegate to Congress in February, 1776, and was in 1777 president of the provincial council of Georgia. He planned a military expedition to East Florida which was unsuccessful. He was killed by Gen. McIntosh in a duel, May 27, 1777.

See Vol. XI. p. 313 Am. ed. (p. 351 Edin. ed.).

GYPSUM (hydrated sulphate of lime, $Ca\ SO_4\ 2H_2\ O$,) is a mineral of considerable industrial value, which occurs abundantly in certain localities in the United States and elsewhere. In this country the most extensive deposits are found in the Palæozoic strata, associated with rock-salt, saliferous marls and clays, and limestones. It is mainly amorphous, but frequently crystallized, the latter form often occurring in broad, transparent folia, said to have been used as glass in ancient Rome. Calcined at a low temperature the water of gypsum is driven off, in which state it constitutes plaster of Paris, with its valuable uses in taking impressions, etc. Gypsum is a product of volcanoes, and exists dissolved in sea-water, it being soluble in 400 to 500 parts of water. The principal beds have been deposited by evaporation of sea-water, hence its association with rock-salt.

In North America gypsum occurs abundantly in Nova Scotia, and in the States of New York, Ohio, Illinois, Virginia, Tennessee, Michigan, Arkansas, Iowa, Kansas, and in the Gulf States from Alabama to Texas. It is also found in large beds and of great purity in many places in Montana, in the Black Hills of Dakota, and throughout Colorado and New Mexico. On the Pacific coast it occurs in considerable abundance, at many points in California, Nevada, and Arizona. In the Mammoth Cave, Ky., it takes the form of rosettes or of flowers, vines, and shrubbery. The New York beds are extensive, stretching across several of the central counties of the State, and in some places 18 feet thick. The annual product in New York and Michigan is about 100,000 tons each, while large quantities are imported from Nova Scotia. In 1882 there were made on the Atlantic coast from Nova Scotia stone 525,000 barrels of plaster. But few of the beds in the Eastern States are worked. In the Rocky Mountain division a single mill at Colorado City supplies the demand. On the Pacific coast there are mills at San Francisco where much plaster is made. (See Fertilizers.) (c. m.)

H.

HABAKKUK. See Prophets.

See Vol. XI. p. 322 Am. ed. (p. 360 Edin. ed.).

HACKBERRY, the fruit of *Celtis occidentalis*, or the nettle-tree, a name given from the resemblance of its leaves to those of some species of nettles. It is a handsome forest-tree, indigenous to the United States, where it ranges from the valley of the St. Lawrence to Eastern Dakota, and south through the Atlantic region to Florida. It is found also in the valley of the Devil's River, Texas, while a reticulate-leaved variety ranges from Texas to East Oregon. Its height is from 50 to 90 feet, and exceptionally 120 feet, and its trunk from 2 to 4 feet diameter. It is most common and best developed in the Mississippi River basin. In aspect it resembles the elm, and presents an elegant appearance, with its broad and richly-tufted head. The flowers appear before the leaves, and are small, axillary, with five stamens and a calyx of five divisions. Ovary one-celled, with single ovule. Stigmas two. The fruit is a globular drupe with thin flesh, sweet and wholesome, of a dull purple or yellowish-brown color. It ripens in autumn and hangs on the tree through the winter. The leaves vary greatly in size, shape, and texture, but the extremes are connected by intermediate forms. The wood is heavy, compact, coarse-grained, and rather soft, and is of a clear light yellow color. It is largely used for fencing, and occasionally in the manufacture of cheap furniture. The hackberry is also known locally by the names of "sugarberry" and "beaver wood." (c. m.)

HACKLÄNDER, Friedrich Wilhelm von, Baron (1816–1877), a German novelist, was born at Burtscheid, Nov. 1, 1816. He was brought up to mercantile pursuits, but served for a time in the Prussian artillery. This experience he utilized in sketches of soldier-life which attracted the attention of Baron Von Taubenheim, who took him on a journey to the East. After his return, Hackländer became secretary to the Crown Prince of Würtemberg, whom he attended in journeys in Italy. In 1849 he accompanied Marshal Radetzky in his campaign against Piedmont. He afterwards resided at Stuttgart, with the exception of a visit to Spain in 1854, until the Italian war in 1859, when the Emperor of Austria invited him to his headquarters. In 1861 the emperor conferred on Hackländer a patent of hereditary nobility. On the death of King Wilhelm in 1864 Hackländer lost his position as director of the royal buildings at Stuttgart, but continued to reside there. He died at a villa near Starnberg, July 5, 1877. His prolific pen produced 70 volumes, including books of travel, comedies, stories, and novels. Among these are *Handel und Wandel* (1850); translated into English by Mary Howitt under the title *Behind the Counter; Der neue Don Quixote* (1858); *Tag und Nacht* (1860); *Das Geheimniss der Stadt* (1868); *Der letzte Bombardier* (1870); *Der Sturmvogel* (1871); *Verbotene Frucht* (1876). In 1857, in connection with Zoller, he founded the illustrated journal *Über Land und Meer* (1860), in which he published many short stories. His most successful comedies were *Geheimer Agent* (1850), and *Magnetischen Kuren* (1851). Part of an autobiography was published in 1878 under the title *Der Roman meines Lebens.* Hackländer's popularity was well deserved; his humor was rich and healthy, and his varied experience gave him abundant material to draw upon.

HADDOCK. A valuable food-fish belonging to the cod family, and closely related to the cod-fish of commerce. This species, classified as *Gadus æglefinus*, is distinguished by a stout form in front of the first anal fin, the body gradually diminishing in size posteriorly. It has a prominent snout, the upper jaw projecting, and has several rows of sharp teeth. All the fin-rays are enveloped by a thick, fleshy membrane. Length, one to two feet. The color is dark gray above the lateral line, which is jet black, while the lower portion of the body is of a beautiful silvery gray. On each side there is a large, oblong, dark blotch.

This species is common on the northern Atlantic coasts of Europe and America. It has long been a favorite food-fish in Europe, and vast quantities of it are annually consumed. The Scotch and Irish fisheries are prolific, though the fishermen need to seek it in deeper waters than formerly. Immense quantities are smoke-cured, and sold under the name of "Finnan haddocks." It exists abundantly on our coast from

New York to the Arctic seas, accompanying the cod, and is caught in great numbers from spring to autumn, sometimes so abundantly as to be sold at a very low price. The best haddock are caught on rocky bottoms, though in the cold season it is most abundant on clayey bottoms. It is estimated that in the warm season 12 cwt. of haddock are taken to 1 cwt. of cod. In the winter these numbers are reversed, yet the total haddock catch in Massachusetts Bay is three times that of cod. It forms an excellent table-fish, either boiled or as chowder, and is largely eaten by the poorer classes of Boston. It is sometimes taken of 17 lbs. weight, but averages from 2 to 6 lbs. The fishery is conducted in the same manner as the cod-fishery, and forms an important part of the fishing interests of New England and British America. (See Cod and Fisheries.)

The Norway Haddock (*Sebastes Norvegicus*) is of a different family. It is found on our north-east coast, but not eaten, though it is esteemed in Norway. It is taken by the hook from Newfoundland to Greenland, and considered an excellent table-fish. (C. M.)

HADES. This Greek word is doubtfully derived from ἀ and ἰδεῖν, meaning the "unseen." The aspirate seems to make this derivation impossible. It is used by Homer for the god of the under-world, but in later writers it became the name of the under-world itself. It corresponds with the Hebrew word Sheol (which *may* come from Shaal, "to ask," as either asking for men, or asked about by men), and is used in the New Testament for the unseen world. It is contrasted with heaven in Matt. xi. 23, and thus represented as beneath the earth. This may arise from the fact of bodies being buried beneath the earth. In Luke xvi. 23 Hades is represented as in sight of "Abraham's bosom," though far off, and separated from it by a great chasm. Yet in this passage we may suppose both Abraham's bosom and the place of torment as being alike in Hades. In the Revelation (i. 18; vi. 8; xx. 13, 14) Hades seems to be used only in an evil sense. It would seem that the word originally referred to the unseen world in general, and had no determinative meaning as regards the condition of those therein. That unseen world was generally regarded as beneath the earth, because bodies were buried in the earth. Gradually the word came to be used of the unseen world as a place of punishment and sorrow. In the New Testament, the probabilities are that it always has an evil meaning, as opposed to Paradise (comp. Luke xxiii. 43, 2 Cor. xii. 4, "caught *up* into Paradise," and Rev. ii. 7).

In the Old Testament Sheol does not always, if ever, have this determinate character. So, while the two words correspond, it is hardly safe to say that they are synonymous. The Bible teaches that the righteous at death go to Paradise (Luke xxiii. 43), to be present with the Lord (2 Cor. v. 8). This scarcely seems compatible with their going to Hades, as Hades is used in the New Testament (Matt. xi. 23; xvi. 18), and yet in the Old Testament the righteous are represented as going to Sheol (Ps. vi. 5), where Sheol may mean the "grave," as in our English version. (H. CR.)

HÆCKEL, Ernst Heinrich, the most prominent of living German naturalists, was born at Potsdam, Feb. 16, 1834. His tendency towards biological science was first shown at the gymnasium of Merseburg, where he displayed a fondness for botany. At Berlin he studied the natural sciences and medicine, and at Würzburg he became the assistant of Virchow, of whom he has since become a declared opponent. In order to investigate the lowest forms of animal life he made journeys to Heligoland and to the Mediterranean in 1854 and 1856. He graduated in medicine, and for about a year practised in Berlin, but his increasing inclination toward comparative anatomy and kindred studies led him to make a scientific journey to Italy and Sicily in 1859. The chief result of this was seen in his illustrated monograph *Die Radiolarien* (1862), which appeared after he had been made extraordinary professor of zoölogy at the University of Jena. In this work he not only arranged and described nearly three times as many species of radiolaria as had previously been known, but showed himself already an earnest advocate of the doctrine of evolution. In 1865 a full professorship of zoölogy was specially made for him in the University of Jena, and he began to form the valuable museum which constitutes one of the most important features of that institution. His lectures there extend over comparative anatomy, histology, palæontology, and other branches which he has brought into the closest connection with general zoölogy. In 1866 he published *Generelle Morphologie der Organismen*, a work in which he sought to apply the Darwinian theory of the origin of species to the whole range of organic morphology. The direction of his investigations had already led him towards the theory of development before the publication of Darwin's work, and he has ever since been one of the most radical German advocates of that theory, from which he at once drew conclusions from which Darwin long held aloof. In the work just named he advanced his interesting theory that the lowest forms of life are neither distinctively animal nor vegetable, but should be classed in an intermediate kingdom, to which he gave the name of *Protista*, but scientists have not accepted this conclusion. In 1867 he delivered a series of lectures on evolution, which were published under the title *Natürliche Schöpfungsgeschichte* (1868). This popular work reached a seventh edition in 1879, and was translated into several languages, an English edition appearing in 1874 as the *History of Creation*. A more immediate application of the doctrine of evolution to the origin of man is found in his *Anthropogenie* (1874), translated into English as *The Origin of Man*. Other series of popular lectures were published under the titles of *Ueber die Entstehung und den Stammbaum des Menschengeschlechts* (1868); *Ueber Arbeitstheilung in Natur und Menschenleben* (1869); and other series have since appeared. In 1870 appeared his *Studien über Moneren und andere Protisten*, and in 1872 his important monograph on the calcareous sponges, *Die Kalkschwämme* (2 vols., with atlas). This was the result of five years' consecutive study of this small group, which he found so strikingly variable that he declared they might all be reduced to one genus and seven species, if their resemblances were closely considered, and that they all seemed traceable to a single ancestral form, the Olynthus. This study led to his celebrated *Gastræa Theorie* (1874), his most valuable contribution to speculative science. In this he traces the whole animal kingdom above the Protozoa to an original sac- or stomach-like form, composed of two cell-layers and with a single aperture, which he calls the *Gastræa*, and points out that at an early embryological stage in the development of all animals a similar or a homologous *Gastrula* form appears. This theory has been very generally accepted by biological scientists. In 1880 he published an elaborate monograph on the *Medusæ*. He has made many scientific journeys besides those mentioned, including a tour of three months in the Canary Islands in 1866, a visit to the coast of Norway in 1869, to the eastern coast of the Adriatic in 1871, to the coral islands of the Red Sea in 1873, to Corsica and Sardinia in 1875, and to Ceylon in 1881. Each of these journeys has afforded abundant material, which he has employed in his lectures and writings. His latest publication of interest is an entertaining personal narrative of his visit to Ceylon, with an account of his scientific observations in that tropical island.

Hæckel is one of the most ardent and thoroughgoing advocates of the development theory, which he pushes to extreme conclusions. He sustains, in common with several other German writers, what he names the Monistic philosophy, in opposition to Dualism; that is, he ascribes "an independent soul-life to every organic cell," and maintains that the soul of man is only the sum of a multitude of special cell activities, dependent on the material phenomena of motion, and that the universe contains only matter in motion. The tendency of his mind is toward bold and hasty speculations, and his scientific standing has been somewhat injured thereby. Even his famous Gastræa theory is now said to have originated in an error, though it has proved to be in accordance with fact. He is very combative in his arguments, and wastes no courtesy on his scientific opponents. Of his controversial works may be named *Free Science and Free Teaching* (1878), published in opposition to the views of Virchow on science in education. As a writer—Hæckel is very clear and perspicuous, and though greatly lacking condensation his popular works appeal strongly to the taste of general readers, and have been very widely read. (C. M.)

HAGEN, Hermann August, a German-American entomologist, was born at Königsberg, Prussia, May 30, 1817. He graduated at Königsberg University in 1836, studied medicine, and practised his profession until 1867. By the invitation of Prof. L. Agassiz, he removed to Cambridge, Mass., to take charge of the entomological department of the Agassiz Museum, and was afterwards professor of entomology at Harvard University. He has published numerous papers and monographs, chiefly on entomology, and *Bibliotheca Entomologica* (1862).

HAGERSTOWN, a city of Maryland, county-seat of Washington county, is picturesquely situated on Antietam Creek, in the fertile Cumberland Valley, 85 miles W. N. W. of Baltimore and 22 miles N. W. of Frederick. It is an important railway centre. The railways passing through are the Cumberland Valley and the Western Maryland. Hagerstown is the N. terminus of the Shenandoah Valley Railroad and of a branch of the Baltimore and Ohio system. The principal public buildings are a fine court-house, a jail, and an academy of music. The town has a free library, public water-works, 9 hotels, 2 national and 3 other banks, 4 weekly and 2 daily newspapers, 13 churches, a female seminary, and 6 public schools. The chief articles manufactured are furniture, spokes, wheels, castings, doors, sashes, brooms, fertilizers, farm-tools, and cigars. The streets are handsome and are well lighted with gas. The city debt is $20,000, the property valuation, $3,250,000. The population is chiefly of American birth and in large part of German descent. Hagerstown was settled about 1750, and was incorporated in 1790. Owing in part to its secluded situation in a well-wooded mountain valley Hagerstown early became a local centre of high social refinement. Its population in 1870 was 5779; in 1880, 6627.

HAGGAI. See Prophets.

HÄHNEL, Ernst Julius, a German sculptor, was born at Dresden, March 9, 1811. He studied architecture under Thürmer, and in 1830 went to Munich, where he became a sculptor. In 1838 he was recalled to Dresden, to prepare sculptures for the new theatre, among which were statues of Sophocles, Aristophanes, Molière, and Shakespeare, and a bas-relief representing the March of Bacchus. He afterwards prepared a statue of Beethoven, erected at Bonn in 1845; a statue of Charles IV. for the University of Prague (1848); and for the new museum at Dresden six statues—Alexander the Great, Lyseppus, Michel Angelo, Dante, Raphael, and Peter von Cornelius. These works and minor decorations occupied him until 1858, when he prepared statues of the Four Evangelists and the Three Kings for the cathedral tower in Dresden. Hähnel has executed other noteworthy statues for his native city; for Vienna, an equestrian statue of Prince Schwartzenberg; and for Leipsic, a bronze statue of Leibnitz. He has been member of the Academy at Dresden since 1842, and professor since 1848.

HAHN-HAHN, Ida Marie Luise Sophie Friederike Gustave, Countess (1805–1880), a German novelist and religious writer, was born June 22, 1805, at Tressow. Her father (1782–1857), through his passion for the theatre, squandered the greater part of his possessions. In 1826 the countess married her cousin, Count Friedrich Wilhelm Adolf von Hahn-Hahn, but was divorced in 1829. Thereafter she resided in Berlin, but made many journeys. Her first publications were some volumes of poems (1835–38), which attracted little attention, but her romances of society, which followed, had remarkable popularity. Among these were *Aus der Gesellschaft* (1838); *Gräfin Faustine* (1841); *Sigismund Forster* (1843); *Cecil* (1844); *Zwei Frauen* (1845). These and others were collected under the title of the first (21 vols., 1844–51). She also published some books of travel, superficial yet attractive. In 1850 she entered the Roman Catholic Church, and thenceforth devoted herself actively to the propagation of her new faith. Her conversion forms the subject of her book, *Von Babylon nach Jerusalem* (1851). In 1852 she retired to a cloister at Angers, but afterwards resided at Mentz, devoting herself to the reformation of fallen women. Here she died, Jan. 12, 1880. Her later works include: *Maria Regina* (1860); *Peregrina* (1864); *Die Glöcknerstochter* (1871); *Die Geschichte eines armen Fräuleins* (1872). Her biography has been published by Haffner (1880), Keiter (1881), and others.

HAIR-TAIL (*Trichiurus*), a genus of tropical marine fishes, remarkable for their compressed and elongated shape, the body being band-like, with a dorsal fin extending the whole length of the back, and having no tail, the body being extended into a slender and compressed cord at its extremity. It is a native of China and America, and is generally found near land, but occasionally wanders far out to sea, and to the waters of the temperate zone. *T. Lepturus*, the silvery hair-tail or ribbon-fish, grows from 2 to 4 feet long, and is caught along the Atlantic shores of the United States. It has a great number of vertebræ, as many as 160 and more. Six species of *Trichiurus* are known.

HALDEMAN, Samuel Stehman (1812–1880), an American naturalist and philologist, was born near Columbia, Lancaster co., Pa., Aug. 12, 1812. He studied at Dickinson College; in 1836 was appointed an assistant in the New Jersey geological survey, and in 1837 in the Pennsylvania survey. While thus engaged he discovered the oldest fossil then known, *Scolithus linearis*. He was professor of natural history in the University of Pennsylvania from 1851 to 1855, and afterwards in Delaware College. He was well versed in etymology, conchology, and palæontology, and published many papers on these subjects. He also gave much attention to the philosophy of language, and in 1858, by his essay, *Analytic Orthography*, won in England the Trevelyan prize over eighteen competitors. He was made professor of comparative philology in the University of Pennsylvania in 1870. He published *Pennsylvania Dutch* (1872), *Outlines of Etymology* (1873), and some other textbooks. He died at Chickie's, Lancaster co., Pa., Sept. 10, 1880.

HALE, Benjamin (1797–1863), an American educator, was born at Newbury, Mass., Nov. 23, 1797. He graduated at Bowdoin College in 1818, was principal of Saco Academy, then studied theology at Andover, and was licensed to preach as a Congregationalist in 1822. After a year's service as tutor in Bowdoin College he established the Gardiner Lyceum, which he conducted until 1827, when he was appointed professor of chemistry and mineralogy in Dartmouth College, where he founded a geological and mineralogical cabinet. Entering the Protestant Episcopal Church he was from 1836 to 1858 president of Hobart College, Geneva, N. Y. He died at Newburyport, Mass., July 15, 1863. He published *Introduction to Mechanical Principles of Carpentry* (1827), *Scripture Illustrations of the Liturgy* (1835), sermons, and educational pamphlets.

HALE, Edward Everett, an American clergyman and author, was born at Boston, April 3, 1822. He is the son of Nathan Hale, the journalist, and nephew of Edward Everett. He graduated at Harvard College in 1839, studied theology, and became pastor of the Church of the Unity, Worcester, Mass., in 1846. In 1856 he became pastor of the South Congregational Church, Boston, Mass., which position he still holds. He has always been active as a journalist and has been editor at various times of the *Christian Examiner* and the *Sunday School Gazette*, and in 1870 founded the *Old and New*, a literary monthly, which he conducted until 1875. Many of his stories, sketches, and instruction papers have been collected in book form. Among his books are *The Rosary* (1848); *Margaret Percival in America* (1850); *Sketches of Christian History* (1850); *Kansas and Nebraska* (1854); *Ninety Days' Worth of Europe* (1861); *The Ingham Papers* (1869); *How to do it; Workingmen's Homes* (1874); *What Career? Mrs. Merriam's Scholars; Seven Spanish Cities; His Level Best.* With his niece he has published several volumes of travel bearing the common title *A Family Flight.* He has also published some volumes of sermons, *Life in Common; Kingdom of God; June to May.* He is specially noted for his skill in giving to romance the appearance of matter of fact, and has been aptly styled "The American Defoe." Perhaps the most notable instance of this quality is his sketch, *The Man without a Country.*

HALE, John Parker (1806–1873), an American statesman, was born at Rochester, N. H., March 31, 1806. He graduated at Bowdoin College in 1827, and settled at Dover, N. H., where he was admitted to the bar in 1830. He was elected to the State legislature in 1832, and was appointed by President Jackson U. S. Attorney for New Hampshire in 1834, but was removed by President Tyler in 1841. He belonged to the Democratic party, but after being elected to Congress in 1843 opposed the annexation of Texas, although the legislature of New Hampshire sent its congressional delegation instructions to support the measure. Hale appealed to the people, and, when the State Democratic convention removed his name from the ticket, became an independent candidate, but was defeated. In June, 1845, occurred his memorable controversy with Franklin Pierce, at Concord, N. H., in which Hale vindicated his course. He was elected to the State legislature in 1846, and was made speaker of the house. He was also chosen to the U. S. Senate, where he was almost the only anti-slavery member, and maintained his cause with skill and good humor. The Liberty Party convention at Cleveland in 1847 nominated him for President, but he declined and supported Van Buren and Adams, who were nominated at Buffalo in 1848. Nominated again by the Free Soil party at Pittsburg in 1852, Hale received 156,149 votes, but no electoral votes. In 1853 he removed to New York city, where he practised law, but in 1855 he was again elected to the U. S. Senate from New Hampshire for an unexpired term, and in 1858 for a full term. He supported the administration of Lincoln, taking an active part in all the legislation pertaining to the civil war. At the close of his term in March, 1865, he was appointed minister to Spain, but in 1869 was removed in consequence of a violation of the revenue laws of Spain, the blame of which, however, Hale laid on his secretary of legation. After his return from Europe he had a stroke of paralysis in 1870, and he died at Dover, N. H., Nov. 19, 1873.

HALE, Nathan (1755–1776), an American patriot, was born at Coventry, Conn., June 6, 1755. He graduated at Yale College in 1773 and became a teacher at East Haddam, and afterward at New London. On receiving news of the conflict at Lexington in April, 1775, he entered the army as lieutenant, and before the close of the year was captain. In September, 1776, while at New York he captured a British sloop laden with provisions, taking her from under the guns of a frigate. After the retreat from Long Island Washington was desirous to obtain full information of the number and plans of the enemy, and Hale volunteered to get this. He crossed to the island and having made full notes of the situation was about to return when he was arrested and taken before Sir William Howe, who ordered him to be hanged as a spy the next morning. His execution took place Sept. 22, 1776, his last words being, "I only regret that I have but one life to lose for my country." His *Life* was published by I. W. Stuart (Hartford, 1856).

HALE, Nathan (1784–1863), an American journalist, nephew of the preceding, was born at Westhampton, Mass., Aug. 16, 1784. He graduated at Williams College in 1804, taught in Exeter Academy for two years, and removed to Boston, where he was admitted to the bar in 1810. While practising his profession he was also editor of the *Weekly Messenger*, and in March, 1814, he purchased the Boston *Daily Advertiser.* In this influential paper he advocated successively the principles of the Federal, Whig, and Republican parties. He opposed the Missouri Compromise in 1820 and the Nebraska Bill in 1854, and gave the start to the free colonization of Kansas in 1856. He was an advocate of a protective tariff and of internal and local improvements. In 1846 he was chairman of the commission to introduce water into the city of Boston, and for nineteen years he was president of the Boston and Worcester Railroad. He was several times elected to the legislature, and was a member of the State Constitutional Conventions of 1853 and 1857. He was one of the founders of the *North American Review* and of the *Christian Examiner.* He died at Brookline, Mass., Feb. 9, 1863.

HALE, Sarah Josepha Buell (1790–1879), an American author, was born at Newport, N. H., Oct. 24, 1790. In 1814 she was married to David Hale, a lawyer of local note, who died in 1822, leaving her with five children dependent upon her exertions. After publishing *The Genius of Oblivion, and other Poems* (1823) and *Northwood, a Tale* (1827), she removed to Boston, where she edited the *Ladies' Magazine.* In 1837 this magazine was united with *Godey's Lady's Book*, published in Philadelphia, and Mrs. Hale removed to that city in 1841. She continued to act as literary editor until her death, May, 1879. She published many books, among which are *Sketches of American Character* (1830); *Traits of American Life* (1835); *Ladies' Book of Cookery* (1852); *Woman's Record* (1855). She edited the *Letters* of Madame de Sevigné and Lady Mary Wortley Montagu (1856).

HALÉVY, Joseph, a French orientalist, was born at Adrianople, Turkey, Dec. 15, 1827. Devoting himself especially to the study of Semitic languages he taught Jewish schools in Adrianople and Bucharest. His Hebrew poems made his name widely known and in 1868 he was commissioned by the Alliance Israelite Universelle to examine the condition of the Falashas of Abyssinia. His report, dated July 30, 1868, attracted attention throughout the world. In 1869 he was sent by the French government on an archæological exploration of Yemen in Arabia. Here he deciphered 68 inscriptions. He has published several volumes on Oriental antiquities and epigraphy.

HALÉVY, Leon (1802–1883), a French poet and dramatist, was born at Paris, Jan. 14, 1802. He belonged to a Jewish family, and was brother of the distinguished composer Halévy (for whom see Encyclopædia Britannica). While attending the Charlemagne Lyceum, he won a high reputation as a Greek scholar. He afterwards studied law, but becoming a follower of Saint Simon, he assisted in founding *Le Producteur* and furnished the introduction to his master's *Opinions littéraires, philosophiques et industrielles* (1825). He had already published numerous poems, and he soon after issued imitations of the principal poets of Europe, *Poésies européennes* (1827). He also wrote a *Résumé de l'histoire des Juifs* (1828), and later *Histoire résumée de la Littérature Française* (1838). Meantime he had been lecturing on literature in the Polytechnic School, and in 1837 was employed in the bureau of historic monuments in the department of public instruction, where he remained until 1853. He won prizes from the Academy by his *Fables* (1843), *Fables nouvelles* (1855), and *La Grèce tragique* (3 vols., 1845–61). Besides, he published many novels, tales, and translations from ancient and modern languages. His dramatic works include a wide range: beginning with a comedy, *Le Duel* (1826), they include tragedies, among which were *Le Czar Demetrius* (1829) and *Electra* (1845), many dramas, and lighter pieces. He also translated *Macbeth.* He died at St. Germain-en-Laye, Sept. 3, 1883.

HALÉVY, LUDOVIC, a French dramatist, son of the preceding, was born at Paris, Jan. 1, 1834. He was educated at the Lyceum Louis le Grand, and entered the civil service, being attached from 1852 to 1858 to the ministry of state, then until 1861 chief of a bureau in the ministry of Algeria. Afterwards he was employed in the *corps législatif*, but when his success as a dramatist was established he retired from public service. He furnished the librettos for Offenbach's music from *Orphée aux enfers* (1861) to *La Boulangère a des écus* (1875). Among these were *La Barbe bleue* (1866); *La belle Hélène* (1867); *La Périchole* (1868); *Frou frou* (1869). They all breathe the seductive, intoxicating, lustful air of the Second Empire. Halévy has also gathered in a volume some equivocal sketches under the title *Monsieur et Madame Cardinal* (1872), to which he has since added *Les petites Cardinal* (1880). His personal recollections of the siege of Paris were published under the title *L'Invasion* (1872). His latest productions are the romances *L'Abbé Constantin* (1882), and *Criquette* (1883). The former indicates a more healthy tone of morals than his usual productions, and contains sketches of American character remarkable for their truthfulness.

HALL, DOMINICK AUGUSTINE (1765–1820), an American jurist, was born in South Carolina in 1765. He practised law in Charleston until 1809, when he was appointed district judge of Orleans Territory. When this Territory became the State of Louisiana, in 1812, Judge Hall was appointed U. S. Judge of the State, and held this office till his death at New Orleans, Dec. 19, 1820. In 1815, while the city of New Orleans was under martial law by the proclamation of Gen. Jackson, Louis Loniallier was arrested on a charge of exciting mutiny among the troops by publishing on Feb. 10 that a treaty of peace had been signed. Judge Hall granted a writ of habeas corpus, but Jackson, instead of obeying the writ, arrested the judge. Four days later the report was proved correct and the judge, being released, summoned Gen. Jackson before him for contempt of court, and imposed a fine of $1000, which Jackson paid. In 1844 Congress refunded the fine with interest.

HALL, JAMES, an American geologist, was born at Hingham, Mass., Sept. 12, 1811. He studied natural science at the Rensselaer Polytechnic Institute at Troy, N. Y., and in 1836 was appointed one of the geologists in the survey of New York. He published annual reports from 1838 to 1841, and a final report in 1843, which were all marked by thoroughness of research. He was then made palæontologist to the State, and published *Palæontology of New York* (5 vols., 1847, 1852, 1859, 1867, 1874). His investigations have extended far beyond the limits of the State, even to the Rocky Mountains. In 1855 he was appointed also geologist to the State of Iowa, and in connection with Whitney and Worthen published a *Report on the Geology of Iowa*, including also its palæontology (2 vols., 1858–60). He was invited to take charge of the palæontology in the Geological Survey of Canada, but his investigations were limited to the study of the graptolites, on which he published a monograph (1865). In 1857 he was made State surveyor of Wisconsin, and prepared a *Report.* He has also contributed to the reports of several western surveys ordered by the national government. His researches have tended to elucidate the order of formation of the various strata of the American continent.

HALL, JOHN, an American clergyman, was born in the County Armagh, Ireland, July 31, 1829. He graduated at Belfast College in 1846, was licensed to preach in 1849, and was employed as a Presbyterian missionary in the west of Ireland. In 1852 he became pastor of the First Presbyterian Church, Armagh, and in 1858 accepted a call to the church of St. Mary's Abbey, in Dublin. He was appointed commissioner of education for Ireland. In 1867 he was delegate from the Presbyterian Church of Ireland to the Presbyterian Churches of the United States, and soon after his return to Ireland was called to the Fifth Avenue Presbyterian Church, New York. He was installed over this congregation Nov. 3, 1867, and in 1875 a splendid church-edifice was erected at Fifth Avenue and Fifty-fifth Street. He is an earnest and eloquent preacher, a frequent contributor to the religious press, and a diligent promoter of all forms of religious and benevolent work. He has published *Family Prayers for Four Weeks* (1868); *Papers for Home Reading* (1871); *Questions of the Day* (1873); *God's Word through Preaching* (1875).

HALL, LYMAN (1725–1790), a signer of the Declaration of Independence, was born in Connecticut in 1724. He graduated at Yale College in 1747, studied medicine, and settled at Sunbury, Ga., in 1752. He was a member of the colonial convention in 1774–75, and was elected a member of the Continental Congress in 1775. He remained in attendance until 1780, when he was called home by the British invasion. In 1783 he was elected governor of Georgia, and served one term. He died in Burke co., Ga., Oct. 19, 1790.

HALL, NEWMAN, an English Congregational preacher, was born at Maidstone, May 22, 1816. He is the son of John Vine Hall (1774–1860), noted as an advocate of total abstinence, and as the author of the tract *The Sinner's Friend.* Newman was educated at Highbury College, and received the degree of A. B. from the University of London. He also won a law scholarship, and obtained the degree of LL. B. in 1835. He afterwards studied theology, and in 1842 was ordained as a Congregational pastor in Hull. In 1854 he was called to become pastor of Surrey Chapel, Black Friar's Road, London. Although a non-conformist, he uses the liturgy of the Church of England, with slight modifications. During the American civil war he was a warm friend of the Union, and in 1865 he visited the United States in an endeavor to promote a friendly feeling between the American and English peoples. In 1873 he made a second visit and lectured in the principal cities, and again in 1884 he made a brief visit. He has published *The Christian Philosopher* (1849); *Land of the Forum and the Vatican* (1853); *Lectures in America* (1868); *History of Surrey Chapel* (1868); *From Liverpool to St. Louis* (1869); *Pilgrim Songs* (1871). His tract *Come to Jesus* has been widely circulated, and has been translated into 30 languages.

HALL, SAMUEL CARTER, an English author, was born at Waterford, Ireland, May 9, 1800, but was soon taken to the family residence at Topsham, Devon. He studied for the bar, and in 1824 became a barrister of the Inner Temple. In 1823 he undertook, with great success, the profession of a parliamentary reporter for the press. In 1824 he married Anna Maria Fielding, who became his literary partner and associate. In 1830 he became editor of the *New Monthly Magazine*, previously conducted by the poet Thomas Campbell. In 1839 he founded the *Art Union*, afterwards called the *Art Journal*, which he edited for 42 years. Among Mr. Hall's books are *The Royal Gallery of Art; The Vernon Gallery; The Book of Beauty; Gems of Eu-*

ropean Art; The Baronial Halls of England; Stately Homes of England* (2 vols., quarto, in part prepared by Llewellyn Jewitt); poems entitled *The Trial of Sir Jasper* and *An Old Story* (1873); and other works. Conjointly with his wife, he produced *Ireland, its Scenes and Characters* (3 vols., 1841–43); *The Book of the Thames* (1859); *A Book of Memories of Great Men and Women* (1871); *Rhymes in Council*, and other writings. He also won fame as a popular lecturer. His wife, **Anna Maria Fielding** (1800–1881), was born in Dublin, Jan. 6, 1800. Her principal writings are *Sketches of Irish Character* (1829); *Chronicles of the Schoolroom* (1830); *Tales of a Woman's Trials* (1834); *The Outlaw* (1835); *Lights and Shadows of Irish Life* (1838); *Tales of the Irish Peasantry* (1840); *The White-Boy* (1845); *Can Wrong be Right? Pilgrimages to English Shrines* (1850); and many other books. The writings, jointly and separately produced by Mr. and Mrs. Hall, are said to fill over 340 volumes. Mrs. Hall has written much more than her husband. Among her works are several successful plays. She died at East Moulsey, Surrey, Jan. 30, 1881.

HALLIWELL-PHILLIPPS, James Orchard, an English critic and antiquarian, was born at Chelsea, June 21, 1820. He was educated at Brighton and Cambridge, and in 1841 took a leading part in organizing the Shakespeare Society. He has published many pamphlets and papers on Shakespearian subjects and early English literature, besides other and larger works, including *The Early History of Free-Masonry* (1843); *The Letters of the Kings of England* (1846); *A Dictionary of Archaic and Provincial Words* (2 vols., 1847); *The Yorkshire Anthology* (1851); *Norfolk Anthology* (1852); *The Evidences of Christianity* (1860); *Notes of Family Excursions in North Wales* (1860); *Rambles in Western Cornwall* (1861); and *An Historical Account of New Place, Stratford* (1804). His folio edition of Shakespeare, in 16 vols., was completed in 1865. In 1873 he assumed his wife's family name of Phillipps. His best work is *Illustrations of the Life of Shakespeare* (1874).

HAMERTON, Philip Gilbert, an English writer, born at Laneside, near Shaw, in Lancashire, Sept. 10, 1834, of an old Yorkshire family. His parents died when he was a child, and his education was cared for by an aunt. He gave great attention to landscape-painting, and after 1855 lived much in Paris and in the Scottish highlands. He was for a time art critic for the *Saturday Review*. In 1859 he married a French lady, and took up his residence in France, chiefly at Autun. His paintings have much originality, but though not without technical merits they have failed of popularity. As an etcher he has achieved a reputation, and some important details of the late improvments in the etching process were invented by him. But he is best known by his writings, which show originality of thought on a variety of subjects, and are rendered attractive by a clear and piquant style. Among them are *Isles of Loch Awe*, Poems (1855); *Painter's Camp in the Highlands* (1862); *Thoughts About Art* (1862); *Etching and Etchers* (1866); *Contemporary French Painters* (1867); *The Etchers' Hand-Book* (1868); *Painting in France* (1868); *Wenderholme, a Story* (1869); *The Unknown River* (1870); *The Intellectual Life* (1873); *Chapters on Animals* (1873); *The Sylvan Year* (1876); *The Life of Turner* (1878); *Modern Frenchmen* (1878); *Paris* (1885).

HAMILTON, a city of Ohio, county-seat of Butler county, is on both sides of the Miami River and canal, 25 miles by rail N. of Cincinnati, and 25 miles S. W. of Dayton. It is on the Cincinnati, Hamilton, and Dayton Railroad, at the junction of lines to Indianapolis and to Chicago, all operated by the same company. It has numerous churches, a public library, an orphanage, a court-house, a high-school, 2 national banks. The manufacturing interests are extensive. The leading articles produced are paper, castings, machinery, farming-implements, woollen goods, and flour. The public-school system is exceptionally good. Manufactures are facilitated by a fine and well-utilized water-power, derived from the Miami by means of a canal. The town was incorporated in 1853. In 1870 the population was 11,081; in 1880, 12,122.

HAMILTON COLLEGE is located in Clinton, Oneida co., N. Y., 9 miles south of Utica, on the Utica and Binghamton Railroad. It was founded in 1793 as an academy, by Rev. Samuel Kirkland, a missionary to the Oneida Indians, and was chartered as a college in 1812, being thus the third college in the State. Its first president, Dr. Azel Backus, gave diplomas to 33 graduates in 3 classes (1812–16); the second president, Dr. Henry Davis, gave diplomas to 329 graduates in 17 classes (1817–33); the third president, Dr. Sereno F. Dwight, gave diplomas to 39 graduates in 2 classes (1833–35); the fourth president, Dr. Joseph Penney, gave diplomas to 53 graduates in 3 classes (1835–39); Dr. Simeon North, the fifth president, gave diplomas to 622 graduates in 19 classes; Dr. Samuel W. Fisher, the sixth president, gave diplomas to 356 graduates in 9 classes (1858–66); the seventh president, Dr. Samuel G. Brown, gave diplomas to 775 graduates in 15 classes. The administration of Dr. Henry Darling, the eighth president, began in 1881, and he has given diplomas to 171 graduates in 4 classes. Presidents Backus, Davis, Dwight, North, and Fisher were graduates of Yale College. Pres. Penney was a graduate of Dublin University; Pres. Brown, of Dartmouth College, and Pres. Darling, of Amherst College. Hamilton College has educated 685 clergymen, 13 college presidents, 32 foreign missionaries, 5 moderators of the Presbyterian General Assembly, 5 State governors, 27 members of Congress, 25 State senators, 27 Supreme Court judges, 464 lawyers, 76 editors, 72 physicians. The Maynard-Knox Law School, now under the charge of Prof. Francis M. Burdick, has sent out 253 graduates. Its first professor was Hon. Theodore W. Dwight, now warden of the Columbia College Law School. Its excellent law library was bequeathed to the college by William C. Noyes, a distinguished lawyer, who died in 1863. The college has also the valuable working library that was used by Dr. Edward Robinson in preparing his *New Testament Lexicon* and *Biblical Geography*. Dr. C. H. F. Peters, director of the Litchfield Observatory, has discovered 43 asteroids, and made 100,000 zone star observations, which he has published in 20 *Celestial Charts*, and distributed to other observatories and learned societies. Under the auspices of the regents of the State University, Dr. Peters has determined the longitude of Buffalo, Syracuse, Elmira, Ogdensburg; the western boundary of the State of New York, and the longitude of the Detroit Observatory at Ann Arbor, Mich. Hamilton College has 13 professorships, most of which are endowed. Prof. Edward North has occupied the chair of Greek since 1843; Prof. A. G. Hopkins, the chair of Latin since 1869; Prof. A. H. Chester, the chair of chemistry since 1870; Prof. A. P. Kelsey, the chair of natural history since 1878; Prof. Oren Root, the chair of mathematics since 1880; Prof. H. C. G. Brandt, the chair of German and French since 1882; Prof. E. J. Hamilton, the chair of metaphysics since 1883. Rev. Arthur S. Hoyt entered upon his duties as professor of rhetoric and oratory in January, 1886.

Fourteen prize endowments give special encouragement to voluntary work in all departments of study. All candidates for the bachelor's degree have the same required studies until the beginning of the third sophomore term, thenceforward mathematics and modern languages are elective. Other electives are open to juniors and seniors. Special students are received who are not candidates for a degree. Graduates of Hamilton College are in good demand as teachers, and about half of each graduating class make engagements for teaching before leaving college, or soon after.

Students of Hamilton College become strongly attached to its rural hillside location, with its far-reaching outlook over the Oriskany Valley. Its campus of fourteen acres is embellished with a great variety of shapely trees, many of them planted by students as class memorials. The pinetum, planted by the late Dr. A. D. Gridley, contains a rich collection of hardy evergreens. The care of the college cemetery is provided for by a permanent fund given by the late S. A. Munson, of Utica. The Memorial Hall is an attractive place for visitors; the history of the college is illustrated by the portraits here seen of many of its benefactors and former officers. Six of these portraits are by Daniel Huntington, a graduate of the college; others are by such artists as Charles L. Elliot, G. A. P. Healy, F. B. Carpenter, E. F. Andrews, and M. E. D. Brown. The portrait bust of the late Edwin C. Litchfield was executed by Hiram Powers near the close of his life.

A college is known to the public mainly through its graduates, and a long list might be given of graduates from Hamilton who have gained distinction in the public service and in various branches of intellectual labor. Much would be lost to American history and American literature with the losing of what we owe to such men as Dr. Edward Robinson, Hon. Gerrit Smith, Rev. Albert Barnes, Dr. Daniel D. Whedon, Dr. Asahel C. Kendrick, of Rochester University; Daniel Huntington, president of the National Academy of Design; Hon. Theodore W. Dwight, of the Columbia College Law School; Dr. Henry Kendall, secretary of the Presbyterian Board of Home Missions; Dr. A. J. Upson and Dr. W. J. Beecher, of Auburn Theological Seminary; Dr. James Eells, of Lane Seminary; Gen. Joseph R. Hawley, of the U. S. Senate; Dr. F. F. Ellinwood, secretary of the Presbyterian Board of Foreign Missions; Pres. D. H. Cochran, of the Brooklyn Polytechnic Institute, Charles Dudley Warner, Dr. Herrick Johnson, and Dr. Arthur T. Pierson. (E. N.)

HAMILTON, FRANK HASTINGS, an American surgeon, was born at Wilmington, Vt., Sept. 10, 1813. He graduated at the University of Pennsylvania in 1833, and settled at Auburn, N. Y., but in 1844 he removed to Buffalo, as affording a better field for his surgical skill. In 1862 he settled in New York, and in 1863 he was made medical inspector of the U. S. army. He was professor of surgery at Bellevue Medical College until 1875, when he resigned, though he retained his connection with the hospital. He has been noted for his invention and improvement of surgical instruments, among which are a bone-drill and various applications of gutta-percha. He has given special attention to plastic surgery and has frequently performed rhinoplasty, taking the skin from the forehead and from the palm of the hand. His publications include *Military Surgery* (2d ed.); *Fractures and Dislocations* (7th ed.); *General Treatise on Surgery* (2d ed.).

HAMILTON, JAMES (1786–1857), an American statesman, was born at Charleston, S. C., May 8, 1786. He was the son of Major James Hamilton, who served on Washington's staff. Soon after he was admitted to the bar he was a major in the war of 1812, and later was elected mayor of Charleston for several years. In 1822 he detected the plot among the negroes organized by Denmark Vesey. In that year he was elected to Congress, where he advocated free-trade and State rights. Pres. Jackson offered to make him secretary of war and afterwards minister to Mexico, but he declined both positions. He was elected governor of South Carolina in 1830, and urged the passage of the nullification act. Gov. Hayne, his successor, appointed him major-general of the State militia. Hamilton was afterwards prominent in the affairs of the republic of Texas. In 1841 he was sent to England and France, to procure the recognition of her independence. He also promoted her annexation to the United States in 1845. He was elected to the U. S. Senate from Texas in 1857, but was drowned by the collision of two steamers off the coast of Texas on Oct. 18, 1857.

HAMILTON, JAMES (1814–1867), a British clergyman, was born at Lonend, Paisley, Scotland, Nov. 27, 1814. After being ordained pastor of a church at Abernyte, Scotland, he was removed to Edinburgh, and in 1841 he was called to the National Scotch Church, Regent's Square, London, originally built to accommodate those who flocked to hear the famous Edward Irving. Hamilton also was a master of pulpit oratory, but his aim was to persuade rather than to thrill and denounce. Successful in ministering to a large congregation, he produced no sensation like his predecessor. Dr. Hamilton was a popular religious writer, his books passing through many editions. The two most widely circulated were *Life in Earnest* (1844) and *The Mount of Olives* (1848). He also wrote *The Royal Preacher* (1851), a commentary on Ecclesiastes; *The Light upon the Path; The Prodigal Son;* and *The Church in the House.* His works were collected in 6 volumes in 1873, and a selection in 4 volumes was published at New York, 1875. His *Life* was published by Rev. W. Arnot.

HAMILTON, JAMES (1819–1878), an American artist, was born in Ireland in 1819, but removed to America at an early age and settled at Philadelphia. He was for a time engaged in commercial pursuits, but afterwards studied art. In 1854 he went to England, and on his return furnished the illustrations for Dr. Kane's *Arctic Explorations*, and other works. His oil-paintings are chiefly marine views, in which he displayed great vigor. Among them may be mentioned Capture of the Serapis, Wrecked Hopes, Morning off Atlantic City. He died at Philadelphia, 1878.

HAMILTON, JOHN CHURCH (1792–1882), an American historian, was born at Philadelphia in 1792, being the son of the famous Alexander Hamilton. (See ENCYCLOPÆDIA BRITANNICA.) He graduated at Columbia College, and was admitted to the bar. He was an aide on the staff of Gen. Harrison in the war of 1812. He devoted his life chiefly to the vindication of his father's reputation as a statesman. For this purpose he published *Memoirs of Alexander Hamilton* (2 vols., 1834–40); *History of the Republic*, as traced in the writings of Alexander Hamilton (2 vols., 1850–58), and edited his father's *Works* (7 vols., 1851). He died July 25, 1882.

HAMILTON, SCHUYLER, an American general, son of the preceding, was born at New York, July 25, 1822. He graduated at West Point in 1841, and served with distinction in the Mexican war, being twice wounded. After the war he served on the staff of Gen. Scott until 1855, when he resigned and took up his residence at Branford, Conn. In 1861 he enlisted as a private in the Seventh New York regiment, but soon was made an officer, and rose to be major-general of volunteers in 1862, serving in the West. He resigned from the service in 1863. He published a *History of the National Flag* (1853).

HAMLIN, HANNIBAL, an American statesman, was born at Paris, Maine, Aug. 27, 1809. He was admitted to the bar in 1833, and in 1836 was elected to the legislature, of which he was speaker from 1837 to 1840. In 1842 he was elected to Congress as a Democrat, and served two terms. In 1848 he was elected to the U. S. Senate for an unexpired term, and in 1851 for a full term. When the struggle over the extension of slavery called the Republican party into being, Hamlin joined its fortunes, and in 1856 was its candidate for governor of Maine. Being re-elected U. S. Senator in the same year he resigned the governorship. In 1860 he was elected Vice-President of the United States on the ticket with Abraham Lincoln. In 1865 he was appointed collector of the port of Boston, but soon resigned. He was again elected to the Senate and served from 1869 to 1875.

HAMLINE, LEONIDAS LENT (1797–1865), an American bishop, was born at Burlington, Conn., May 10, 1797. He was educated for the ministry, but studied law, and practised at Zanesville, Ohio. In 1828 he joined the Methodist Episcopal Church, and in 1829 was licensed to preach. In 1832 he was admitted to the Ohio Conference, and in 1834 was stationed at Cincinnati. In 1836 he was made assistant editor of the *Western Christian Advocate*, and in 1841 editor of the *Ladies' Repository*, then established. In 1844 he was a delegate to the General Conference, and drew up the plan of separation, which was required by the division of the church on the subject of slavery. At the same conference he was chosen a bishop, and he continued to discharge this office until 1852, when he resigned on account of ill-health. In 1857 he removed to Mount Pleasant, Iowa, where he died, Feb. 22, 1865. His *Works* were published in 1869.

HAMMOND, James Hamilton (1807–1864), an American statesman, was born at Newberry, S. C., Nov. 15, 1807. His father, Elisha Hammond (1780–1829), born in Rochester, Mass., graduated at Dartmouth College, became professor of languages in South Carolina College, and afterwards president of that college. James graduated there in 1825, was admitted to the bar, and edited the *Southern Times* at Columbia. He was a strenuous supporter of State rights, advocated nullification, and in 1833 organized the military force which South Carolina raised to resist the national government. He was a member of Congress, 1835–37, and governor of South Carolina, 1842–44. In reply to British attacks on slavery, he wrote letters in its defence, which were collected under the title *The Pro-Slavery Argument* (1853). In 1857 he was elected to the U. S. Senate, where, in a speech delivered March, 1858, he applied to the laboring classes the term "mud-sills," and declared, "Cotton is king, and no power on earth dares make war on it." In September, 1858, in a public speech at Columbia, he opposed the reopening of the slave-trade, which was then agitated. On the secession of South Carolina, in 1860, he withdrew from the Senate, but took no public part in the civil war. In 1861 he was made president of South Carolina College, but the institution was soon suspended. He died at Beach Island, S. C., Nov. 13, 1864.

HAMMOND, Samuel (1757–1842), an American soldier and statesman, was born in Richmond co., Va., Sept. 21, 1757. In 1775 he fought at Kenawha and Long Bridge. In 1779 he raised a company of soldiers and joined in the Southern campaign under Gen. Lincoln. He fought at Stono Ferry, and was assistant-quartermaster at the siege of Savannah. In 1781 he was made a colonel of cavalry, and he served under Gen. Greene till the end of the war. He then settled in Georgia, where he was made surveyor-general. In 1793 he led a volunteer corps against the Creek Indians. He was member of Congress from 1803 to 1805, when he was appointed by Pres. Jefferson civil and military commander of Upper Louisiana. In 1824 he removed to South Carolina, when he was appointed surveyor-general in 1827, and secretary of state in 1831. He died near Augusta, Ga., Sept. 11, 1842.

HAMMOND, William Alexander, an American physician, was born at Annapolis, Md., Aug. 28, 1828. He graduated in the medical department of New York University in 1848, and entered the U. S. army as assistant surgeon in 1849. In October, 1860, he became professor of anatomy and physiology in the University of Maryland. He was reappointed assistant surgeon in the army, May 28, 1861, and when the medical department was reorganized in April, 1862, he was made surgeon-general. He displayed executive abilities of a high order, but often came in conflict with the secretary of war, and finally was dismissed from the service by order of court-martial in August, 1864. His professional standing was undisturbed by this fact. He then became professor in Bellevue Hospital Medical College, and also a physician-in-chief to the New York State Hospital for diseases of the nervous system. He has published many treatises, among which are *Military Hygiene* (1863); *Physiological Memoirs* (1863); *Venereal Diseases* (1864); *Insanity in its Medico-Legal Relations* (1866); *Sleep and its Derangements* (1869); *Physics and Physiology of Spiritualism* (1870); *Diseases of the Nervous System* (1871; new ed., 1881); *Insanity in its Relations to Crime* (1873); *Insanity in its Medical Relations* (1883). He has also published three novels, *Lal* (1882), *Dr. Grattan* (1883), and *Mr. Oldmixon* (1885).

HAMPTON, Wade (1755–1835), an American general, was born in South Carolina in 1755. In the Revolutionary war he served under Sumter and Marion. He was a member of Congress, 1795–97; and again 1803–05. He was appointed colonel in the U. S. army, and in 1809 brigadier-general. He was stationed at New Orleans, but being frequently involved in quarrels with his subordinates he was superseded by Wilkinson in 1812. As major-general in 1813 he was placed in command of an army on the Canada frontier, but his advance was baffled by an inferior force. He also refused to co-operate with Wilkinson in an attempt on Montreal, and in April, 1814, resigned his commission. He had acquired a large fortune by speculation in lands and was said to own more than 3000 slaves. He died at Columbia, S. C., Feb. 4, 1835.

HAMPTON, Wade, an American general and statesman, grandson of the preceding, was born at Columbia, S. C., March 28, 1818. He graduated at South Carolina College in 1838, studied law, and served in both branches of the State legislature, being a senator when the State seceded. He commanded the Hampton Legion of cavalry at the first battle of Bull Run, where he was wounded. Being made brigadier-general he served in the Peninsular campaign, and was wounded at Seven Pines, May 31, 1862. He commanded a cavalry force in the invasion of Maryland and at Antietam. He was also engaged in the invasion of Pennsylvania in 1863, and was severely wounded at Gettysburg, losing a leg. He was made lieutenant-general in 1864, and commanded the cavalry of Lee's army until December, when he was sent to South Carolina. In February, 1865, he commanded the rear-guard of the Confederate army at Columbia, where large quantities of cotton had been stored. When his forces evacuated the city on the approach of Gen. Sherman's army, the cotton took fire and a large part of the city was consumed. At a later period a sharp controversy arose between Hampton and Sherman as to the responsibility for the conflagration, but the fire appears to have been accidental in its origin. Hampton was elected governor of the State in 1876 and again in 1878. He was elected to the U. S. Senate in 1878, and re-elected in 1884.

HANCOCK, Winfield Scott (1824–1886), an American general, was born near Norristown, Pa., Feb. 14, 1824. He graduated at West Point in 1844 and entering the Sixth infantry served on the frontier until 1846. He was then engaged in the Mexican war and was brevetted first-lieutenant for gallantry at Contreras and Churubusco. After the war he returned to frontier duty until November, 1855, when he was appointed captain in the quartermaster's department and ordered to Florida during a campaign against the Seminoles. In 1859 he served as quartermaster of the southern district of California, and used his influence to oppose secession. In 1861 he was relieved at his own request and sought active duty in the field. He was sent first to Kentucky, and being made a brigadier-general of volunteers, Sept. 23, 1861, organized a brigade at Lewinsville, Va. In McClellan's Peninsular campaign Hancock was with Gen. W. B. Franklin and distinguished himself by a bayonet charge at Williamsburg, May 5, 1862, which won from McClellan the compliment which became proverbial, "Hancock was superb." In the battles around Richmond he rendered valuable service, especially at Frazier's Farm, June 30, 1862. He was active in the Maryland campaign, and at Antietam on the death of Gen. Richardson succeeded to the command of his division. He was promoted major-general of volunteers, Nov. 29, 1862, and at Fredericksburg he took part in the assault on Marye's Heights. Again at Chancellorsville, May 4, 1863, Hancock maintained his well-earned reputation, and soon after was placed in command of the Second corps. At Gettysburg, July 1, 1863, after the death of Gen. Reynolds, he succeeded to the command at the front, and stayed the retreat which had begun. Seizing Culp's Hill, as an advantageous position, he induced Gen. Meade to make the fight there. As commander of the left centre of the Union forces, Hancock on July 3 sustained and repulsed the last determined assault of Lee's army. Having been severely wounded he was debarred from further service in the field for several months, but was engaged in stimulating enlistments in the Northern cities. In 1864 he returned to his command and was conspicuous in the advance under Gen. Grant. At the battle of the Wilderness, May 5–7, Hancock had under his command about 50,000 men; at Spottsylvania, May 12, he captured 4000 prisoners; at the bloody battle of Cold Harbor, June 3, his corps lost over 3000 men. His service was then interrupted by the breaking out of his wound, but he was afterwards engaged in the siege of Petersburg, and in the following winter he organized a veteran corps at Washington. In February, 1865, he was appointed to the command of the Middle Military division, and while he held this position the civil war was brought to a close. In July, 1866, he resigned his commission in the volunteer service, and was made major-general in the regular army. Being transferred to the department of the Missouri he conducted expeditions against the Cheyennes and Sioux. In September, 1867, he was ordered to the department of the Gulf. His declaration in "Order No. 40," on taking this command, that the military force was to be used only in subordination to the civil authority, attracted attention throughout the Union, and caused him afterwards to be made the Democratic candidate for President. In March, 1868, he was transferred to the military division of the Atlantic, and a year later to the department of Dakota. After three years' service on the plains he was, on the death of Gen. Meade, recalled to the command of the division of the Atlantic, which he held till his death, which occurred at Governor's Island, New York harbor, Feb. 9, 1886. In the Democratic National Convention, in July, 1868, and again in 1876, he was a prominent but unsuccessful candidate for the Presidential nomination. He was however placed in nomination by the convention which met at Cincinnati in July, 1880, and in the following November received 4,442,035 votes, while Gen. J. A. Garfield received 4,449,053. This result gave Gen. Hancock 155 electoral votes from 19 States, while Gen. Garfield received 214 from 20 States.

Throughout his career Gen. Hancock well deserved the title "superb," being a brave, fearless soldier, ever loyal to his superiors, and entirely free from jealousy. Earnestly patriotic, he gave himself to the duty of defending his government and flag when assailed. Though the choice of many of his fellow-citizens for the Presidency, his ability as a statesman was never fairly tested, but his military record is splendid and untarnished.

HANNIBAL, a city of Missouri, in Marion county, is on the Mississippi River, 111 miles by rail or 150 by water N. N. W. of St. Louis. A grand railway bridge of iron crosses the river to East Hannibal, Ill., where the main line of the Wabash, St. Louis, and Pacific is met by a branch of the Chicago, Burlington, and Quincy. Hannibal is the centre of an important network of railways. Of these the Chicago, Burlington, and Quincy, the Missouri Pacific, the St. Louis, Hannibal, and Keokuk, and the Wabash, St. Louis, and Pacific occupy a passenger-station in common, near which is that of the Hannibal and St. Joseph and the St. Louis, Keokuk, and North-western Railroads. Its extensive connections by rail and river render Hannibal a place of great business activity. It is well supplied with schools (public and private), churches, banks, and newspapers, and has a city-hall and other good public buildings. It carries on a large trade in lumber, flour, meats, tobacco, cattle, and grain, and has important car-works, machine-shops, flour-mills, tobacco-factories, lime-kilns, and other industrial establishments. There are coal-mines in the near vicinity. The bluffs and slopes near the city have many handsome residences. Hannibal College (Methodist Episcopal Church South) was founded in 1868. The city in 1870 had a population of 10,125; in 1880, 11,074.

HARBAUGH, Henry (1817–1867), an American clergyman, was born near Waynesburg, Pa., Oct. 28, 1817. He worked on a farm until 19 years of age, when he became a carpenter. In 1840 he entered Marshall College, Mercersburg, Pa., and after spending three years there was ordained pastor of a Reformed church at Lewisburg. In 1850 he accepted a call to Lancaster and in 1860 to Lebanon. In 1863 he was made professor of theology in the seminary at Mercersburg, and held this position till his death, Dec. 28, 1867. He was a popular writer on religious topics. He established *The Guardian*, a religious monthly, and edited it for sixteen years. He also edited other denominational periodicals, and during the last year of his life the *Mercersburg Review*. He published *Heaven or the Sainted Dead* (1848); *Heavenly Recognition* (1851); *Heavenly Home* (1853); *Birds of the Bible* (1854); *Life of Michael Schlatter* (1857); *Fathers of the Reformed Church* (1858); *Christological Theology* (1864). He also published some volumes of poems and hymns, and wrote poems in the Pennsylvania German dialect, which were gathered under the title *Harbaugh's Harfe* (1870).

HARBORS AND DOCKS. This article is limited to the harbors of the United States, and for convenience the leading characteristics of these harbors will be considered under the following divisions:

See Vol. XI. p. 406 Am. ed. (p. 455 Edin. ed.).

I. The Atlantic Seaboard. II. The Gulf Coast. III. The Pacific Coast.

I. *Atlantic Seaboard.*—Calais, Me., is the centre of a large lumber trade; population, 6172. There is a bar or ledge at Marks Point, 5 miles from the town. Mean depth over bar at low water is 8 feet. No anchorage in harbor, vessels being obliged to make fast to the wharf. Eastport, Me., dealing in fish and lumber, has a harbor which is not obstructed by ice during the winter. The main entrance to the bay is only 5 miles from the city, which can be approached to within any distance. The other entrance, Lubeck Straits, is crooked and dangerous. The roads are not tenable in a gale from the N. E. In such cases and in winter Brood's Cove is used. Rockland has an open harbor with a depth of 5 fathoms to within half a mile of the wharf, near the centre of the city, and about 3 fathoms to the wharves. Often closed by ice in winter. The best anchorage for protection is under the lee of the breakwater near Jamesson Point.

Frenchman's Bay, 14 miles long and 6 miles wide, is deep and easily accessible. Winter Harbor within its limits is one of the best on the coast. Penobscot Bay extends from Isle au Haut on the east for 20 miles to White Head on the west. From the entrance to the mouth of the Penobscot River is 28 miles. Fort Knox, at the narrows of the Penobscot, defends the harbor. Bangor has an extensive lumber, ice, and ship-building trade. Fourteen feet can be carried to the moorings, but the channel is rapidly filling up with saw-dust and slabs from up the river, and is closed for three months of the year by ice. Can carry 6 to 14 fathoms up to the town of Bucksport, where there is good anchorage, but a very strong current. Limekin's Bay is a deep harbor with a least depth of 5 fathoms, but is used only as a harbor of refuge. The harbor of Wiscasset can hardly be surpassed. It is 14 miles up the Sheepscot River; depth in channel 9 fathoms. Bath has the largest ship-building and ship-owning interests in the State of Maine. Five fathoms can be carried to the city, 12 miles up the Kennebec River; mean rise and fall of tide, 7 feet. The river, owing to the strong current, is seldom closed by ice. Entrance to the river to be defended by Fort Popham, at present unfinished.

Casco Bay is 18 miles long and 12 miles wide. There are 136 islands in the bay, many fertile and nearly all inhabited. Portland, on a peninsula on the west shore, has an extensive foreign and coasting trade, and is the principal shipping port for Canada during the winter, as the harbor is never obstructed by ice. Population, 35,080. Can carry 5 fathoms to within ½ mile of and 16 feet up to the wharves; mean rise and fall of tide, 8.9 feet. There are four entrances to the harbor, but only the most southern can be used by large vessels, owing to the crooked and shallow character of the others. The harbor is defended by Forts Gorges, Preble, Scammell, and a battery on Portland Head. Richmond Island Harbor, being easily entered when vessels cannot get into Portland, is an excellent harbor of refuge, as there is good anchorage in 5 fathoms within ⅜ of a mile of the breakwater, except when gales are blowing from south to west. There is no anchorage off Saco, the depth being only 3 feet in some places; mean rise and fall of tide, 8.2 feet. Can anchor in 5 to 7 fathoms 3½ miles from the city in Saco Bay; also in Winter Harbor, at the mouth of the river, 5½ miles from the city.

Portsmouth Harbor is formed by the lower reaches of the Piscataqua River. This is the site of an important naval station—the U. S. navy-yard being opposite the city of Portsmouth, distant ½ mile. The anchorage is good in any except the narrow portions of the bay, where the current is swift, and 6 fathoms can be carried up to the city. The usual anchorage for vessels, not going up to the city or the navy-yard, is at Pepperell's Cove in from 6 to 11 fathoms. The harbor is never closed by ice; mean rise and fall of tide, 8.6 feet. The harbor is defended by Forts Constitution, McClary, and Sullivan, all in a dilapidated condition. Newburyport Harbor is obstructed by a bar with only 6 feet of water at low tide, but this is being deepened. Rockport Harbor forms the best harbor of refuge on the northern shore of Cape Ann. There are 8 fathoms in the inner and 11 fathoms in the outer harbor.

Massachusetts Bay, between the headlands of Cape Ann and Cape Cod, distant 38 miles, contains the important harbors of Gloucester, Salem, Boston, Plymouth, and Provincetown. Gloucester Harbor has good anchorage in 5 fathoms within ⅜ of a mile of the shore, and in 3½ fathoms close to the shore. It is frozen over in winter. The city, with a population of 19,329, has the largest fishing industries in the United States. Salem has a large coasting and ice trade, can carry 3½ fathoms into the inner harbor, within ½ mile of the town, and 4½ fathoms to Fort Pickering, 1 mile from the city. The inner harbor is closed by ice during January and February. Forts Lee, Pickering, and Sewall defend the harbor. Marblehead Harbor is rarely obstructed by ice, and 4½ fathoms can be carried to within ½ mile of the town. The channel is clear, and the harbor easy of entry. Lynn Harbor is little used, the nearest anchorage, in 4½ fathoms, being 2 miles from the shore.

Boston has a population of 362,839. At any tide 21 feet can be carried through the main channel with safety; mean rise and fall of tide, 9.4 feet. There are two other channels. The defences are Forts Warren and Independence. The U. S. navy-yard is situated in the district of Charlestown, opposite the city of Boston proper, at the junction of the Rivers Mystic and Charles. The inner harbor of Plymouth is closed by ice during the winter, and the whole harbor is sometimes frozen over. Not more than 21 feet can be carried into the outer harbor. Barnstable Harbor can only be entered by small vessels. Provincetown has one of the finest harbors on the coast, being easy of access, with plenty of water, and good holding ground. It is usually clear of ice, except during severe winters.

Sandwich Harbor, in the south-western part of Cape Cod Bay, has a difficult and narrow entrance, but it is to be the entrance to the ship-canal from Cape Cod Bay to the head of Buzzards Bay. This proposed canal calls for a harbor at Barnstable, formed of two breakwaters, enclosing a basin of 120 acres, to protect the opening of the canal. The northern breakwater is to be 4000 feet long, and the southern one 2000 feet, the opening between the two extremities to be 700 feet. The only work so far is preliminary or prospecting. The harbors of Nantucket Sound are small, poor, and of no importance. There are several good harbors on both shores of Vineyard Sound, viz., Wood's Hole, Edgartown Harbor, and Vineyard Haven. Wood's Hole has a small but good harbor, depth 3½ fathoms. Vineyard Haven has a good harbor, except when the wind is from the north. Edgartown inner harbor is small and narrow, but has excellent anchorage in 17 feet. The outer harbor is open to the north, but has good holding ground in 4 fathoms.

Buzzards Bay, 20 miles long, has deep water throughout. The entrance between Gooseberry Neck and Cuttyhunk Point is 5½ miles across, with a depth of from 9 to 12 fathoms in mid-channel. The most important harbor is that of New Bedford. Can carry 16 feet into the inner harbor through a narrow, crooked channel. The outer harbor, ½ mile from the city, is an open roadstead with 4½ fathoms of water. There are forts at Fort Point and Clark's Point. Up to Fall River 16½ feet can be carried. Newport has a fine harbor with water enough for the largest ships; 19 feet can be carried into the inner harbor. It is the site of the U. S. Torpedo Station, and is defended by Fort Adams and earthworks on Dutch Island. Block Island Basin is an artificial harbor formed by the government for the shelter of small vessels. It is 130 yards in diameter and 7 feet deep, and is protected by a heavy stone breakwater. The anchorage off the lower end of the town of Bristol is 21 feet, and good anchorage can be got in 5 fathoms 2 miles from the town. Twenty-one feet can be carried through a dredged channel 1½ miles long to Providence; the nearest anchorage, in 5 fathoms, is 4½ miles distant. The harbors of Long Island Sound are New London and New Haven, with a number of "tidal" harbors for light-draught coasters on the northern shores. On the southern shores are Greenport and Sag Harbor, Huntington and Oyster Bays, Hampstead and Manhasset Bays, all of which, except the last named, can be entered at low water by vessels drawing 18 feet. The sound is very free from dangers throughout its length, and affords good anchorage in bad weather. New London Harbor, one of the finest in the United States, is formed by the lower portion of the Thames River, and is 3 miles long and 30 feet deep. The entrance is defended by Forts Trumbull and Griswold. Twelve feet can be carried through a very narrow channel to New Haven, and 5 fathoms to within 4 miles of the city. The harbor is defended by Fort Hale. Gardiner's Bay has good anchorage in from 3½ to 8 fathoms. The bay has an average diameter of 6 miles, is protected from all directions, and is singularly free from dangers.

The noble and capacious harbor of New York is entered from Long Island Sound through the East River, the channel between Willet's Point and Throg's Neck being about three-fourths of a mile wide. East River forms a large part of the water front of New York and Brooklyn, and docks stretch along its shores for miles. The removal of some of the obstructions in East River (see HELL GATE IMPROVEMENT) will have an important bearing on the defence of the harbor, and already a large foreign trade, principally in petroleum, has taken to this route. There are three channels between the reefs, called, respectively, the Main Ship Channel, to the west of the Great and Little Mill Rocks; the Middle Channel, between the Little and Great Mill Rocks and the Middle Reef; and the Eastern Channel, between the Middle Reef and Hallett's Point. The Upper Bay is entered from the ocean through the Narrows, between Staten Island and Long Island. Between 7 and 8 miles below the Upper Bay is Lower New York Bay, a harbor sufficient in capacity for all the fleets of the world.

Perth Amboy has a large coal-trade. Eleven feet of water can be carried up to the town; mean rise and fall of tide, 5.4 feet. During severe winters the harbor is sometimes closed with ice, but steamers can force their way through. Eight feet can be carried over the bar to Little Egg Harbor; rise and fall of tide, 3.4 feet. The channels are very crooked. There is no harbor at Atlantic City except for small vessels, though it can be approached within 3½ miles with 5 to 6 fathoms. Lewes is a small town 2 miles southward and westward of the Delaware Breakwater. Four to 5 fathoms can be carried under the lee of the breakwater; rise and fall of tide, 3.5 feet. Twenty feet can be carried up the Delaware River to Christiana Creek, and 12 feet up the creek to Wilmington, Del.; rise and fall of tide, 5.7 feet.

Hampton Roads, defended by Fortress Monroe, is an excellent rendezvous for a fleet, and there is plenty of water for vessels of any draught from the entrance of Chesapeake Bay to within a short distance of the fort. Twenty-five feet can be carried to Newport News, a growing shipping-town; rise and fall of tide, 2.5 feet. Norfolk, Va., has a large commerce, principally in cotton. Twenty-one feet can be carried to the city through a narrow channel. The U. S. navy-yard is situated at Gosport, on the Elizabeth River, adjoining Portsmouth and nearly opposite to Norfolk. To Annapolis Harbor 19½ feet can be carried over the bar; tide, .9 of a foot. The U. S. Naval Academy is situated here. To the city of Baltimore 24 feet can be carried through a dredged channel 11 miles long; rise and fall of tide, 1 foot. Nineteen feet can be carried to Washington, 200 miles from the ocean. The channel is very narrow above Mt. Vernon. Richmond is 150 miles from the mouth of the James River. Eighteen feet can be carried to City Point, 40 miles below Richmond, and 13 feet to the city; rise and fall of tide, 3.6 feet. Only 8 feet can be carried to the town of Edenton, N. C. Newberne, N. C., ships lumber, tar, and turpentine. Ten feet can be carried to the town, but only 8 feet over the bar from the sea into Pimlico Sound. Ten feet can be carried to Plymouth, but only 8 feet can be brought from the sea. Fourteen feet can be carried over the bar to Beaufort. Inside Fort Macon there are 18½ to 30 feet, with good anchorage, and 9½ feet can be carried within ¼ mile of the town. Wilmington, N. C., with a population of 17,250, has a considerable trade in lumber, cotton, and turpentine. The city is 30 miles above the mouth of the Cape Fear River. Eight feet can be carried over the outer bar at the mouth of the river, and 7 feet in river channel to the city; tide, 4.5 feet. There is good anchorage off the town of Smithville in from 4 to 6 fathoms, and 14 feet can be carried over the bar; tide, 4.5 feet. Georgetown, S. C., ships lumber and turpentine. The town is 14 miles from the bar at the entrance on Winyaw Bay. Seven and one-half feet can be carried to the town. Charleston, S. C., has a large foreign trade, shipping quantities of cotton, phosphate, and naval stores. Fourteen feet can be carried over the bar to the South Channel, and inside 21 feet can be carried by this channel to the city. Port Royal, S. C., has a fine harbor with 21 feet over bar. Savannah, Ga., ships large quantities of cotton, rice, lumber, and naval stores. Seventeen feet can be carried over the bar at the mouth of the river, and 9 feet to the city; mean rise and fall of tide, 7 feet. Brunswick, population 7,000, has one of the best harbors on the coast. Its waters form an arm of the sea, 20 miles long and from 1 to 5 miles wide, with an easy approach through a deep, wide channel; depth on bar, 17 feet; 9 feet can be carried up Brunswick River to the city.

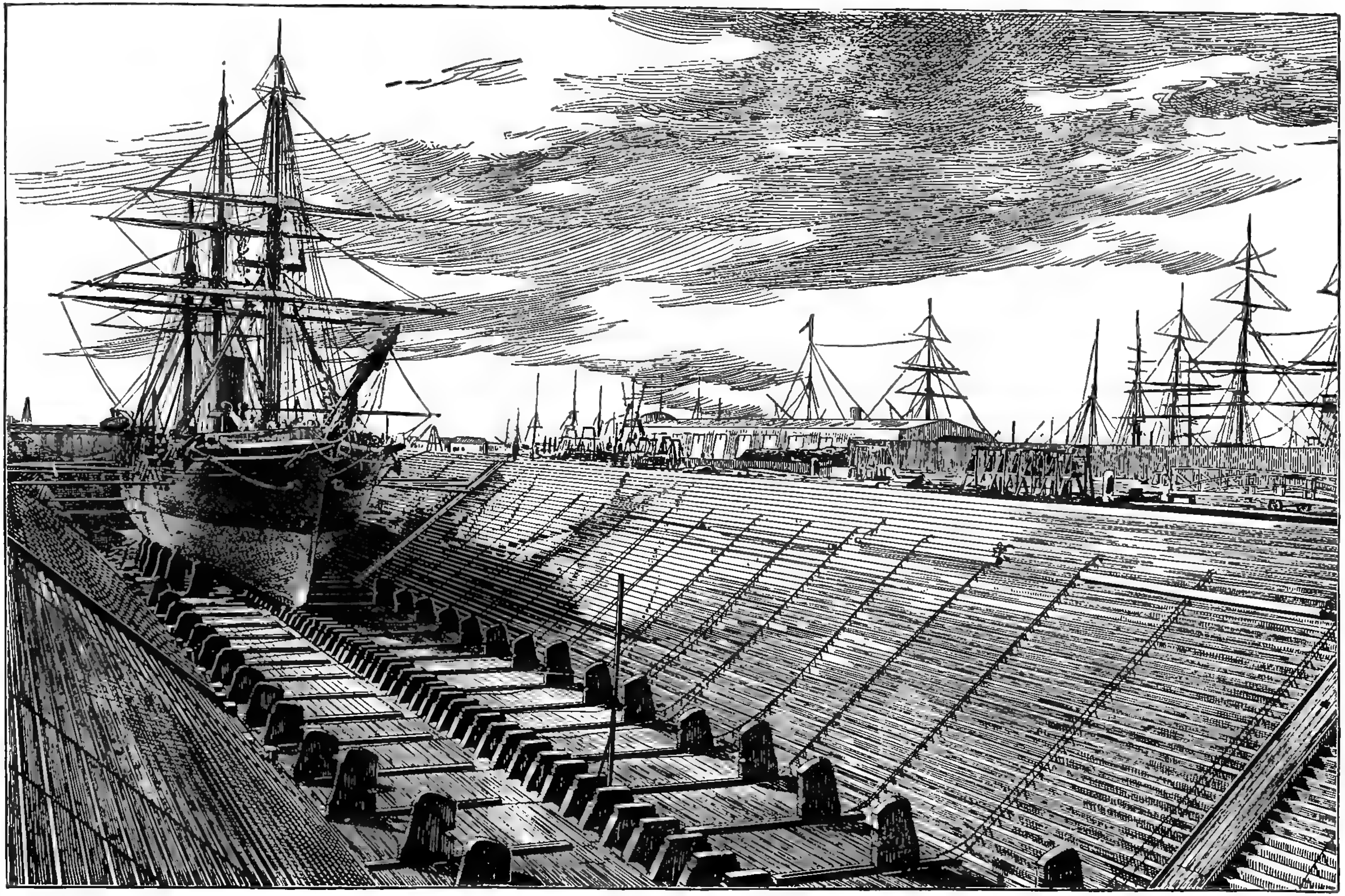
The harbor of St. Mary's, Fla., has several good anchorages inside of the bar in from 3½ to 7 fathoms. Only 11 feet can be carried over the bar, and 17 feet to the town, 10 miles distant. There is 11 feet on the bar at the entrance of the harbor of Fernandina; inside there is good anchorage in from 3½ to 9 fathoms. Principal trade is in lumber. Jacksonville is on the St. John's River, 20 miles from its mouth. Nine feet can be carried over the bar and to the town through a narrow, crooked channel. Saint Augustine has a shifting bar with 10 feet of water, inside of which there is a good harbor to the northward of the town, with from 18 to 20 feet; rise and fall of tide, 6 feet.

II. *Gulf Coast.*—Key West has a trade principally in cigars and sponges. There are several channels entering the harbor, the best being the Main Ship Channel through which 23 feet can be carried; 30 feet can be carried through the S. W. Channel, and 12 feet through the N. W. Channel. There is good anchorage for the largest vessels within 1½ miles of the town. It is defended by Fort Taylor and batteries and two Martello towers. The Dry Tortugas, a group of ten low islets at the S. W. extremity of the chain of Florida reefs, form a large, deep, and commodious harbor. This splendid harbor is defended by Fort Jefferson on Garden Key. If this harbor came into the possession of an enemy it would afford an excellent base for hostile naval operations, but would afford no resources to an enemy beyond good anchorage and a place to rendezvous. Tampa Bay is an extensive estuary from 6 to 10 miles wide, extending from Egmont Island in N. N. E. direction about 22 miles, where it forms two arms. Twenty-one feet can be carried round the east and north sides to a deep lane on the west side. Anchorage in from 4 to 5 fathoms. Cedar Keys is the terminus of the Florida Railroad. There are three channels to the settlement, Sea-Horse Key Channel being the deepest, with 9 feet on its bar.

The Suwanee River has but 5 feet over the bar at its mouth. But this river is likely to become of great importance as the Gulf port of the proposed Florida Ship Canal from Fernandina, on the Atlantic coast, to the St. John's River, up the river to and through Doctor's Lake; thence by cut into the Suwanee River; thence to the Gulf of Mexico. The canal is to be 200 feet wide and 30 feet deep. The harbor on the Atlantic will require but little work to make it of the required depth, but the harbor at the mouth of the Suwanee will cost $1,000,000. The canal will cost $25,000,000, and will take three years to build. Appalachee Bay, a small bight in the N. E. corner of the Gulf of Mexico, is the seaport of Tallahassee, but is very shallow and is seldom visited. Appalachicola is a shipping port for lumber. Fifteen feet can be carried over the bar at the entrance of the bay through the West Pass, but only 4 feet can be carried to the town; rise and fall of tide, 2 feet. St. Joseph's Bay is a large, deep, and commodious bay just north of Cape San Blas. It is easy of access, affords excellent anchorage, and can be entered in a gale or hurricane. The entrance with 19 feet of water is about a mile wide, the depth in the bay varying from 25 to 33 feet. St. Andrew's Bay, with three barred entrances, is only navigable for vessels drawing less than 13 feet. Pensacola Bay is protected by the Santa Rosa Island, a low sandy ridge not more than ⅓ mile broad. The entrance, ⅞ mile wide and 19½ feet deep, is defended by Forts Pickens and McRee, and Fort Barrancas and redoubt on the north side. The city of Pensacola, which ships large quantities of lumber, is 10 miles from the entrance and the U. S. navy-yard 3 miles.

Mobile Bay is an estuary 30 miles long. Just within

PLATE XXX.



THE SIMPSON DRY DOCK, ERIE BASIN, BROOKLYN, N. Y.

the entrance, on the east side, is Bon Secours Bay, 10 miles long and 10 miles wide. The Mobile River flows into the N. W. corner of the bay and is navigable for 53 miles. The entrance between Fort Morgan and Dauphin Island is 2¾ miles wide, but is obstructed outside by Pelican and Sand Islands, 3 miles southward, and 2 miles farther out by a narrow bar with 21 feet at low water. Eighteen feet can be carried through a dredged channel 21 miles long to the city of Mobile, the natural outlet of the greatest cotton region of the United States. It is defended by Forts Morgan and Gaines. Mississippi Bay, with only 5 feet of water, is connected with Mobile Bay by Grant's Pass.

New Orleans is on the left bank of the Mississippi, 120 miles from the sea. The extremity of the delta spreads into four prongs between passes termed the South-west, South-east, North-east, and South Pass. The South Pass is 26 feet deep and 300 feet wide. Capt. James B. Eads' famous jetties are at the entrance to this pass. The South-west pass has 15 feet of water, the South-east 7 feet, the North-east 12 feet in its southern channel and 9½ in its northern channel at low water Forts Jackson and St. Philip are on opposite banks at Plaquemine Bend, 170 miles below the city. The delta and neighboring waters are defended by the following works: Fort Pike, Rigolets; Fort on Ship Island, Mississippi Sound; Fort Macomb, at Chef Menteur Pass, connecting Lake Pontchartrain with Lake Borgne and the Gulf of Mexico; Tower Dupré, Battery Bienvenue, and Tower at Proctorsville, on Lake Borgne; and Fort Livingston, Barataria Bay. Barataria Bay is an extensive lake connecting with the Mississippi, 10 miles above New Orleans, by a canal navigable by light-draught steamers and coasters. Timbalier Bay is only navigable by light-draught vessels. At the outer part of Atchafalaya Bay there is 10 feet of water, but only 7 or 8 feet can be carried by narrow, tortuous channels within the bay. Galveston, Texas, ships large quantities of cotton, and is the most important commercial port in Texas. Eleven feet can be carried over the outer bar and 9½ feet to the city wharves; rise and fall of tide, 1½ feet. Jetties are to be constructed to deepen the entrance to 25 feet. Defended at Fort Point and Bolivar Point by earthen batteries. Brazos Santiagos has 21 feet alongside its wharves; only 6 feet can be carried over the bar.

III. *Pacific Coast.*—Port Townsend, Washington Territory, has a fine harbor, and 5 to 9 fathoms can be carried close to the shore near the centre of the town. Steilacoom has a fine harbor, and 6 to 15 fathoms can be carried within ¼ mile of the town. Seattle has a large trade in lumber. Up to the wharves 4½ fathoms can be carried, and there is plenty of water at the anchorage off the town. Can carry 3½ fathoms to within 1½ miles of Olympia; inside of that the bay shoals rapidly to a large mud-flat in front of the town, uncovered at low tide; rise and fall of tide, 12 feet. New Dungennes has a good harbor, with 5 to 15 fathoms, but it is open to the eastward. Astoria, Oregon, has large establishments for canning salmon. Sometimes there is 27 feet on the bar at the mouth of the Columbia River, but it is a shifting bar and the depth varies. From the bar to the town (14 miles) there is over 28 feet of water. During winter months there is at times a heavy sea breaking over the bar, delaying passage of all vessels for several days. Reliable information is lacking as to the amount of water that can be carried to the city of Portland. When the river is in good condition 19 feet can be carried to the wharves, but during August and September only 17 feet, according to masters of San Francisco steamers. Nine feet can be carried over the bar at the mouth of the Yaquina River to Newport; rise and fall of tide, 7.8 feet. Ten feet can be carried over the bar to Koos Bay, and 17 feet up to Empire City. Crescent City, California, has a very dangerous harbor and should not be entered without a pilot on account of the numerous shoals and rocks. Twenty-five feet can be carried to the anchorage near Whaler's Island, and 14 feet to the wharf. Trinidad Bay, a small roadstead open to the southward, is a good summer harbor, but is dangerous in winter. Fourteen feet can be carried to the wharves of Trinidad. Mendocino has an open harbor with 5 or 6 fathoms at anchorage, ¼ of a mile from the settlement. Benicia contains a U. S. arsenal and several small factories. Twenty-five feet can be carried up the San Pablo Straits to the town. Drakes Bay is a harbor of refuge from northwest gales. Vallejo is situated on the opposite side of Napa Creek from the U. S. navy-yard, 27 miles north of San Francisco Bay. Twenty-one feet can be carried to the anchorage between the town and the navy-yard; rise and fall of tide, 6 feet. San Francisco, population 233,960, has one of the finest harbors in the world. Twenty-three feet can be carried over the bar to the city and in almost any part of the bay; rise and fall of tide, 3.6 feet. Santa Cruz has a harbor well protected, except from northerly gales. There is good anchorage in from 3½ to 15 fathoms within ½ mile of the shore. The harbor of San Luis Obispo is open to the southward. Good anchorage in 3 to 5 fathoms. Santa Barbara exports large quantities of wood and fruit. The harbor is open to the southward, but is partially protected by a large island. There is 19 feet alongside the wharves. Thick kelp extends out about ½ mile. Inside this the anchorage is good, though it is not safe in winter. San Diego Bay forms the next best harbor on the coast after San Francisco. The port is formed by a bold projecting point of land on the west side, terminating at its southern extremity in Point Lima, and on the east side by a low, flat peninsula, connected by a narrow slip of sand-beach to the mainland, between which the bay winds around and forms an indentation about 6 miles long and 2 miles wide in widest part. The entrance is over a bar with 21 feet of water.

For Lake Harbors, see NAVIGATION, INLAND.

DOCKS may be divided as follows: Wet-docks, or basins, dry- or graving-docks, and floating-docks.

The wet-dock, or basin, is seen on the grandest scale at places where there is a great rise and fall of tide or where there is not water-front enough to provide wharves sufficient for the unloading of the many ships discharging at a large city. It will be understood that with a rise and fall of tide of as much as 12 feet it is very convenient to have a basin cut off from the influence of the tide, where vessels can lie in water of a fixed level alongside the quays and landing-stages while discharging their cargoes. Such docks are seen on a large scale at London. These are always kept full and have gates or locks which keep in or out the tidal waters as desired, while along the quays are huge landing-stages, packing-yards, cranes, and every kind of apparatus necessary for the loading, unloading, and custody of goods. Vessels can be kept in the docks for undergoing internal repairs, taking in and discharging cargoes, or fitting out for sea. The London docks cover an area of 120 acres. They have four gates on the Thames, and have room for 300 large vessels. The warehouses can stow 220,000 tons of goods, and the cellars will hold 8,316,050 gallons of wine. The Victoria and Albert Docks, farther down the river, are 2¾ miles in length and are lighted by electric lights and provided with every convenience and accommodation for sailing-vessels and steamers of the largest size.

Dry-docks are used for external repairs, and sometimes vessels are built in them. Such docks are built of wood or stone. The entrance is closed by a gate or caisson—a vessel having a projection or keel on the bottom and ends. This vessel is fitted with pumps and is ballasted. When filled with water and in place across the entrance the keel fits into a groove in the masonry at the bottom and sides of the entrance, forming a dam against the passage of the water. The top is wider than the bottom, so that to remove it the water is pumped from it, and it rises and can be towed aside, or else, as in some later docks, is hauled off on a track in direction of its length. When a vessel is to be docked the blocks upon which she is to rest are fixed in place, the filling culverts are then opened, and the water rises to the level outside. The caisson is then floated and removed, as explained above, and the vessel towed in and held by four or more hawsers. The caisson is now placed across the entrance, a valve opened in the bottom, and it sinks into its place. Water is now drained into a well through draining culverts leading from the dock, and the level reduced enough to bring a pressure on the outside of the caisson, fixing it securely in its place. By these culverts command is held over the level of the water as the vessel takes the blocks. Water is now pumped out by means of large pumps and the vessel shored (or propped). Workmen can then get at any point along the outside and make needed repairs. When a vessel is launched she is subjected to strains greater than she is ever likely to be subjected to in service, so that many of the heavy iron-clads of England are built in dry-docks and launching dangers avoided, as the vessel is simply floated out. Advantage is also gained in the handling of heavy weights.

Most of the dry-docks now building in the United States are of wood instead of stone. They are built of spruce pile foundations throughout, upon which are fitted and secured heavy transverse floor timbers of yellow pine, covered with spruce planking to form the floor, and carry the keel blocks, the latter being further supported by rows of piles driven under the floor timbers, and capped with heavy yellow-pine timbers lengthways of the dock, the heads of the piles being cased in a continuous bed of Portland cement. Open box drains on each side of the keelway beneath the floor timbers lead to the drainage culverts at the head of each dock. The sides and heads slope at 45°. The alters are carefully filled in with clay puddle as the sides are built up, and from the level of high water to the top of coping the sides are built of concrete *en masse* faced with Hoope's artificial stone, the alters being continued of the same material to the coping level. The dock is closed by an iron caisson or floating gate, made with sloping ends, corresponding with the slope of the side walls, which bears against the sill and solid timber abutments the whole length of its keel and stem, no grooves being used, the joint being made water-tight by means of a rubber gasket secured to the face of the sills and abutments. The cost of such a dock is from 30 to 40 per cent. of that of a stone dock of the same capacity built upon the same site, and can be built in one-third the time.

The graving-dock is open, and vessels are put in it at high tide to receive repairs on the fall of the tide. Before copper sheathing was introduced they were used to bream or clean the bottoms of ships by fire.

Floating-docks have many merits, and are very useful. They can be employed in deep water, and in situations where from the nature of the ground other docks could not be cut. They are also independent of the action of the tide, and if the demand for their use is diminished at one port they can be moved to another where the demand is greater.

Floating sectional dry-docks consist of several sections joined together by sliding beams. Each section consists of a large rectangular box or tank, at the sides of which are frames formed of four uprights. In each frame a float is made to travel up and down by suitable gearing, rising when lowering the sections and being forced down when raising a vessel.

Balance floating-docks consist of hollow walls built along the two longer sides of a large rectangular tank, the whole looking like a large floating dry-dock without any ends. It is called a balance-dock because it is divided into a number of compartments, and by pumping water into or letting water out the side chambers any level or trim can be got.

The patent tubular floating-docks are very interesting. Both the bottom and vertical sides consist of a number of circular wrought-iron tubes. The bottom is formed of eight circular tubes running longitudinally, and the sides of similar tubes fixed vertically in the two outer longitudinal tubes. The tubes are divided into a great number of water-tight compartments. A certain number of the chambers are sealed, but the others are provided with water valves at the bottom. When it is desired to sink the dock the bottom valves are opened. When it is desired to raise it compressed air is forced into the tubes, and the water expelled through the bottom valves, which are closed as soon as the dock and its vessel are fully raised.

. The hydraulic lift-dock is a decided departure, for instead of lifting the vessel into a large reservoir of water and pumping it dry the vessel is lifted bodily out of the water upon a raft-like pontoon that possesses sufficient buoyancy to sustain the weight of the vessel. As soon as the ship is lifted and floated away on its own pontoon the dock is free to be employed on another pontoon to raise a second ship. The pontoon is brought up between two rows of columns extending down to the dock below. These columns carry hydraulic lifts, from the heads of which rods extend and are made fast to lattice girders extending across to the opposite column On these girders the pontoon rests. When the pontoon is raised the water is let out by the bottom valves and it is floated away.

Dry-docks of more than 58 feet breadth in the ports of the United States.

Port.	Kind.	Length over all.	Width of entrance at top.	Depth over sill at ordinary high-water. Spring-tides.	Material.	Location.
Buffalo..........	Basin.	350	60	10		
Detroit..........	"	308	65	13		Foot Orleans St.
"	"	360	75	11.5		
Albina, Oreg..	"	400	72	28		
San Francisco.	Floating.	210	60	20 .	Wood.	
" ...	Basin.	450	90	24	Stone.	Hunter's Point.
" ..	"	529	78	26.5	"	Navy-yard.
Portland, Me.	"	425	80	24	Wood.	
Portsmouth, N. H.......	Floating.	350	90	23	"	Navy-yard.
Boston..........	Basin.	379	60	25	Stone.	
"	"	365	64	17.5	Wood.	East Boston.
New York......	Balance.	330	90	18.5	"	Foot Rutgers St.
"	Sectional.	360	100	20	"	Between Pike and Clinton St.
"	"	250	75	16	"	
"	"	170	65	16	"	
Brooklyn.......	Basin.	350	66	25	Stone.	Navy-yard.
"	"	540	100	22	Wood.	Erie Basin.
"	"	630	85	25	"	
Jersey City....	Balance.	185	62	14	"	Foot Essex St.
Philadelphia...	Basin.	434	70	21.5	"	Cramp's Yard.
" ...	Sectional	200	62	14	"	
Baltimore......	Basin.	504	80	23	"	Locust Point.
"	Floating.	220	67	14	"	
Norfolk	Basin.	320	60	......	Stone	Gosport.
New Orleans...	Floating.	315	90	16	Wood.	
"	"	220	75	14	"	
"	"	225	75	16	"	

For the mud-docks at Vizagapatam, India, a deep ditch is dug close to the river and at high tide is filled. The vessel is dragged in and two rows of stakes and mats placed across the entrance and filled in with mud. The mud thrown out from the ditch forms a high wall. Mud is thrown in, raising the level of the water and so elevating the ship. The ship then rests in the mud, and beams are hauled under her and the mud scooped away till her bottom can be got at. To undock, four sets of hawsers are coiled in the shape of cones made solid by filling in with mud. These cones are places under the bilges forward and aft, larger ends out. The dock is dug to the required depth, leaving the ship resting on the beams and cones. The beams are removed and by simultaneously uncoiling the hawsers, beginning at the bases, the cones gradually subside and the vessel with them. (L. N.)

HARCOURT, Sir William George Granville Venables Vernon, an English statesman, was born Oct. 14, 1827. He is the second son of Rev. William Vernon Harcourt, and grandson of Archbishop Harcourt. He graduated with high honors at Trinity College, Cambridge, in 1851, and was called to the bar at the Inner Temple in 1854. He was made queen's counsel in 1866. He had in the meantime acquired high reputation by letters on international law published in the *Times* with the signature *Historicus*. These discussed with great learning and ability the relation of the English government to the American belligerents in the civil war. They were collected and enlarged in a volume in 1863. Mr. Harcourt entered Parliament in 1868 as the representative of the city of Oxford. He was made professor of international law at the University of Cambridge in 1869. He served on the royal commission to amend the neutrality laws and again to amend the naturalization laws. He was made solicitor-general in November, 1873, and received the honor of knighthood. He retired from office with Mr. Gladstone in 1874, and when the Liberals were successful in 1880 Sir Vernon Harcourt was made secretary of state for the home department. He was, however, defeated in the election at Oxford city, but was then elected for Derby, which he still represents. He retired again from the Cabinet in 1885, but returned in February, 1886, as chancellor of the exchequer.

HARDEE, William J. (1815–1873), an American general, was born at Savannah, Ga., Oct. 10, 1815. Graduating at West Point in 1838, he entered the Second dragoons, served in Florida, and was made captain in 1844. He fought in the Mexican war, and was brevetted lieutenant-colonel for bravery. He then served on the frontier until 1856, when he was appointed commandant of cadets and instructor in tactics at West Point. In 1860 he was made lieutenant-colonel of cavalry, but resigned in 1861 and entered the Confederate service as brigadier-general. He commanded in Northern Arkansas, and afterwards fought at Shiloh, April 6, 1862, being promoted major-general for bravery. At Perryville, Oct. 9, 1862, he was again distinguished and was made lieutenant-general. He commanded the Third corps at Stone River, Dec. 29, 1862. He fought at Chickamauga, Chattanooga, and Mission Ridge, and succeeded Gen. Bragg in the chief command, Dec. 2, 1863, until the arrival of Gen. J. E. Johnston. He commanded at Savannah and at Charleston until their surrender to Gen. Sherman. He afterwards fought at Bentonville, N. C., but surrendered with Gen. Johnston's army, April 27, 1865. He died at Wytheville, Va., Nov. 6, 1873.

HARDIE, James Allen, an American general, was born at New York, May 5, 1823. He graduated at West Point in 1843, entered the artillery service, and was assistant professor at West Point, 1844–46. He served in the Mexican war as major of the First New York volunteers, and afterwards was employed on the frontier and in garrison duty. He was made lieutenant-colonel and aide-de-camp on Gen. McClellan's staff, Sept. 28, 1861, and served in the Peninsular and Maryland campaigns. He was afterward on the staff of Gen. Burnside and of Gen. Hooker. He was assigned to special duty in the war department and was assistant to Secretary Stanton and his successors in that department until 1870.

HARDING, Chester (1792–1866), an American portrait-painter, was born at Conway, Mass., Sept. 1, 1792. In early life he removed to Western New York, where he worked on a farm. He served in the war of 1812, and afterwards was engaged in various pursuits. While engaged in house-painting at Pittsburg, he had his portrait painted and afterwards endeavored to paint his wife's picture. Having attained some success, he painted many portraits in Kentucky, and then went to Philadelphia for instruction in art. Being successful he bought a farm, but in August, 1823, went to England, where he spent three years. On returning he settled in Boston, and, after another visit to England in 1843, took up his residence at Springfield, Mass., but spent the winters in the West and South. He died at Boston, April 1, 1866. He painted portraits of nearly all the prominent Americans of his time, and also several eminent Englishmen.

HARDY, Arthur Sherburne, an American mathematician and novelist, was born at Andover, Mass., Aug. 13, 1847. He was educated at Phillips Academy, Andover, at Amherst College, and at West Point, graduating at the latter in 1869. He served for two years as second-lieutenant of artillery, and then resigning became professor of applied mathematics and civil-engineering in Iowa College in 1871. He was professor of civil-engineering in the Chandler Scientific School, Dartmouth College, 1874–78, and has since been professor of mathematics in the same college. His mathematical books include *Elements of Quaternions* (1881); *Imaginary Quantities* (1881); and *Topographical Surveying* (1884). His novels are *Francesca da Rimini* (1878), and *But yet a Woman* (1883).

HARDY, Thomas, an English novelist, was born in Dorsetshire, June 2, 1840. He studied architecture, and in 1863 gained a prize for an *Essay on Colored Brick and Terra-Cotta Architecture.* But he afterwards turned to novel-writing, his first work being *Desperate Remedies* (1871). Then followed *Under the Greenwood Tree* (1872), *A Pair of Blue Eyes* (1873), *Far from the Madding Crowd* (1874), *The Hand of Ethelberta* (1876), *The Return of Native* (1878), *The Trumpet-major* (1880), *Two on a Tower* (1882). He has succeeded in giving interesting pictures of life among English country-folk, especially in his native Dorsetshire.

See Vol. XI. p. 425 Am. ed. (p. 476 Edin. ed.).

HARE, an extensive family of rodent mammalia, comprising many species of the genus *Lepus*, family *Leporidæ*. This genus includes the common hare and rabbit, with many other species, mainly confined to the Northern Hemisphere, and most abundant in North America. It is not easy to divide the hares and rabbits into distinct groups, there being no marked difference of structure. Their main distinction is one of habit, the social and burrowing *Leporidæ* being classed as rabbits, the solitary and non-burrowing as hares. It is the habit of the latter to construct forms or nests on the surface. There are more than 40 species of *Lepus*, nearly half of which belong to North America. The distinguishing feature of the genus is the presence of 4 incisor teeth in the upper jaw, the front pair being well developed, the lateral ones very small. The molar teeth are more numerous than in rodents usually, the upper jaw having 6 on each side, the lower jaw 5. The eyes are large and prominent, the ears very large, the tail short and turned up. The hind legs are usually much longer than the fore ones, which gives the animals great power of leaping. They are all very timid, and depend mainly on their speed for safety.

The American hares extend into the Polar regions, the Polar hare (*Lepus glacialis*) being the largest of the family, and exceeding a large cat in size. It is two feet long to the root of the tail. In winter it is of a pure white color, in summer of a brownish-gray above, whitish below, with fine, soft, and full fur. The flesh is said to be delicious. It is found in the cold and sterile regions from Newfoundland to the far north, where it feeds on berries, bark, evergreen leaves, etc. It does not usually seek shelter from the Arctic winter by burrowing in the snow, but generally has its lair behind a large stone which partly protects it from the wind. *L. Americanus*, the northern hare, is very widely distributed from Virginia and New Mexico to 68° north. It is a little smaller than the former, whitish in winter and reddish-brown in summer. It is very swift and active, and is said to be able to leap 21 feet at a bound. It frequents thick woods, and winds through tangled wood-paths when pursued until it wears out its pursuer. Its flesh is not much esteemed.

Another common species is *L. sylvaticus*, the wood hare, or the ordinary gray rabbit, which is found almost throughout the United States. *L. aquaticus*, the swamp hare, and *L. palustris*, the marsh hare, frequent wet regions, and are excellent swimmers and divers. They belong to the Southern States. There are many other species found in all parts of the United States, while other species, not markedly different from these in character, are abundant in Europe and the other continents. (C. M.)

HARE, AUGUSTUS JOHN CUTHBERT, an English author, was born at Rome, Italy, March 13, 1834. He was the son of Francis G. Hare, but when an infant was adopted by the widow of his uncle, Augustus William Hare. He was educated at Harrow and at University College, Oxford. He has edited *Murray's Hand-books* for some counties of England, but is best known by his interesting books on Italy. Among these are *Walks in Rome* (1870); *Days near Rome* (1874); *Cities of Northern and Central Italy* (1875). He has also published *Wanderings in Spain* (1872), and *Walks in London* (1877). The *Memorials of a Quiet Life* (1872), a record of various members of the Hare family, is a charming biography.

HARE, ROBERT (1781–1858), an American chemist, was born at Philadelphia, Jan. 17, 1781. His father, an English immigrant, had a large brewery, and the son for a time had a share in the business. But led by his fondness for chemistry in 1801 he invented the oxy-hydrogen blowpipe, by which he was enabled for the first time to render platinum and some other metals fusible. The American Academy conferred on him the Rumford medal for this invention, Yale College gave him the honorary degree of M. D. in 1806, and Harvard in 1816. He had in that year produced the calorimotor, a form of the galvanic battery, by which intense heat is generated. This was afterwards modified by Prof. Silliman and accepted by Faraday as the best form of apparatus for the purpose. Dr. Hare held the professorship of chemistry in the University of Pennsylvania from 1818 to 1847. He was an excellent instructor in the natural sciences. Late in life he became a believer in spiritualism, and published *Spiritual Manifestations Scientifically Demonstrated* (1855). He died at Philadelphia, May 15, 1858. He had contributed many papers to scientific journals and published some books on Chemistry. His son, JOHN INNES CLARK HARE, was born in 1817, studied law, and has since 1851 been a judge in the District Court of Philadelphia. He was joint author with Horace B. Wallace of *American Leading Cases* (1847), and has annotated several law-treatises.

HARE, WILLIAM HOBART, an American bishop, was born at Princeton, N. J., May 17, 1838, being a son of Rev. Dr. George Emlen Hare. He was educated at the University of Pennsylvania, but did not graduate. He was ordained in the Protestant Episcopal Church in 1859, and had charge of churches in Philadelphia until 1870. He was then made secretary and general agent of the Foreign Committee of the Board of Missions. He was appointed missionary bishop of Niobrara by the House of Bishops in November, 1872, and consecrated Jan. 9, 1873. He has exerted himself for the protection and Christianization of the Indians.

HARLAN, JAMES, an American statesman, was born in Clarke co., Ill., Aug. 25, 1820. He graduated at Indiana Asbury University in 1845, studied law, and settled in Iowa. He was made State superintendent of instruction in 1847, and was appointed president of Iowa Wesleyan University in 1853. He was elected U. S. Senator from Iowa in 1855, and continued to represent that State until March, 1865, when he was called by President Lincoln, at the beginning of his second term, to be secretary of the interior. He held this position until September, 1866, when he was again elected Senator from Iowa. When his term expired, in 1873, he retired to private life. From the formation of the Republican party he was a moderate but firm supporter of its policy.

HARLESS, GOTTLIEB CHRISTOPH ADOLF (1806–1879), a German Lutheran theologian, was born at Nuremburg, Nov. 21, 1806. He studied theology at Erlangen, graduating in 1829, and afterwards taught there, being full professor from 1836 to 1845. Being then removed from his professorship by the Bavarian government, he accepted a call to Leipsic as professor, and in 1847 was also made pastor of a church there. He exerted great influence on the Lutheran Church in Saxony, and in 1850 was appointed chief court preacher at Dresden. In 1852 he was recalled by the Bavarian government to be president of the Protestant consistory at Munich and member of the state council. In January, 1879, having become completely blind, he retired from all public duty. He died at Munich, Sept. 5, 1879. He was an influential exponent of strict Lutheran orthodoxy. Among his numerous works the most valuable are his *Commentary on Ephesians* (1834; 2d ed., 1858); *Theologische Encyclopädie und Methodologie* (1837); *Die christliche Ethik* (1842; 7th ed., 1875); *Das Verhältniss des Christenthums zu Kultur- und Lebensfragen der Gegenwart* (1863); *Jakob Böhme und die Alchimisten* (1870; 2d ed., 1882); *Staat und Kirche* (1870). He also published an autobiography (1872).

HARMAN, FRANÇOIS JULES (1845–1883), a French explorer, was born in October, 1845, at Saumar. He entered the surgical staff in the navy and took part in various expeditions since 1870. He went to Algeria in the campaign against the Kabyles in 1871, then with Garnier to Tonquin, where he was for some time governor. He returned to France in 1874, but set out for Cambodia in 1875 and pushed his explorations far to the north of that region. In 1881 he returned to Paris seriously ill with consumption, and was made keeper of the Colonial Museum. He died at Florence, April 14, 1883.

HARMS, CLAUS (1778–1855), a German Lutheran theologian, was born at Fahrstedt, Holstein, May 25, 1778. Until he was nineteen years old he assisted his father, who was a miller. Then he began to study at Meldorf, and afterwards at Kiel, and became a private teacher. In 1806 he became deacon at Lunden, and in 1816 archdeacon in the church of St. Nicholas at Kiel. Though frequently called elsewhere, he remained here, and in 1835 he was made chief pastor of this church and provost of Kiel. In 1849 he resigned his office on account of loss of sight, and he died Feb. 1, 1855, at Kiel. On the tercentenary of the Reformation, in 1817, he published 95 theses, in which he opposed rationalism and set forth the strictly orthodox Lutheran doctrines on sin, faith, and grace. A controversy ensued, in which about 200 essays appeared, those of Schleiermacher and Ammon being the most important. The result was a decided revival of orthodox belief. Harms published several volumes of sermons and essays, an *Autobiography* (1852), *Pastoraltheologie* (3d ed., 1878), and some minor treatises. He was a thoroughly popular preacher, and in 1878, on the hundredth anniversary of his birth, a tablet was placed on the house in which he had lived.

HARMS, GEORG LUDWIG DETLEV THEODOR (1808–1865), a German clergyman, was born at Walsrode in Lüneburg, May 5, 1808. He studied theology at Göttingen and taught privately until 1844, when he became assistant to his father, the pastor of Hermannsburg. In 1849, having succeeded to sole charge of the parish, Harms founded an institute, in which manual labor was combined with theological training to fit young men for missionary labor, especially in Africa. Pastor Harms' father had been a rationalist, but he himself was an earnest, spiritual-minded preacher. His sermons reached the hearts of the people and his labors resulted in an extensive revival. Hermannsburg became a strictly religious community, and his missionary institute founded a new Hermannsburg in

South Africa. Some volumes of his sermons were widely circulated in Germany. Among these were *Evangelienpredigten* (8th ed., 1877), and *Epistelpredigten* (3d ed., 1875). His brother, Theodor Harms, published his *Lebensbeschreibung* (4th ed., 1874) and his *Briefe* (1879).

HARNACK, Theodosius, a German Lutheran theologian, was born at Petersburg, Jan. 3, 1817. He studied theology at Dorpat, Bonn, and Berlin, and in 1843 became privat-docent of theology at Dorpat. In 1845 he was made extraordinary professor and in 1848 professor of theology in the same place. In 1853 he accepted a call to Erlangen, but in 1866 he returned to Dorpat and in 1873 he retired from his professorship. He is an orthodox Lutheran and has been influential by his works and teaching. He has published *Die Idee der Predigt* (1844); *De theologia practical* (1847); *Der christliche Gemeindegottesdienst* (1854); *Luther's Theologie* (1862); *Die Kirche, ihr Amt, ihr Regiment* (1862); *Practische Theologie* (1877–82). He has contributed to Herzog's *Encyclopædia* and published an edition of *The Teaching of the Apostles*, found by Bryennios (1883).

HARNETT, Cornelius (1723–1781), an American patriot, was born in England, April 20, 1723. Having removed to America while young, he became a wealthy planter near Wilmington, N. C. In 1770 he was elected to the provincial assembly, where he was chairman of important committees. Josiah Quincy, who visited him in 1773, called him "the Samuel Adams of North Carolina." Harnett was a member of the provincial Congress in 1776, and prepared the instructions to the North Carolina delegates to the Continental Congress. He also served on the committee to draft the State constitution and bill of rights. Under the new constitution he became a member of the council. In 1778 he was elected to the Continental Congress, and signed the Articles of Confederation when proposed to the States. He was afterwards captured by the British forces in North Carolina, and, while a prisoner, died at Wilmington, N. C., April 20, 1781.

HARNEY, William Selby, an American general, was born in Louisiana in 1798. He entered the army in 1818 as second-lieutenant, in 1833 became major, and in 1836 lieutenant-colonel of dragoons. He served in Florida against the Seminoles, and in 1840 gained the brevet of colonel. In 1846 he become colonel, and served with distinction in the Mexican war, gaining a further brevet at Cerro Gordo. He afterwards served on the plains, where he was noted as an Indian fighter. His athletic strength, skill, and endurance gave him high repute among the tribes. On Sept. 3, 1855, he completely defeated the Sioux on the North Fork of the Nebraska River. In 1858 he was made brigadier-general and commander of the department of Oregon. On July 9, 1859, he took possession of San Juan Island in Puget's Sound, which the English government also claimed as belonging to British Columbia by treaty. The dispute was finally decided in 1875 by the arbitration of the German emperor in favor of the United States, but Gen. Harney's action was premature, and he was recalled. He was placed in command of the department of the West. In April, 1861, while on his way to Washington, he was arrested at Harper's Ferry by Virginia officers and taken to Richmond, where he was promptly released. On his return to St. Louis he warned the people of Missouri against secession. On May 21 he made a truce with Gen. Sterling Price, who commanded the State militia, agreeing to make no military movement as long as the peace was preserved by the State authorities. He was soon after relieved of command and was retired from service in August, 1863. He resided in St. Louis, where he possessed great wealth. In August, 1867, he was member of the Indian Commission. In 1884 he was married a third time.

HARPER, Robert Goodloe (1765–1825), an American statesman, was born near Fredericksburg, Va., in 1765. His parents removed to Granville, N. C., while he was a boy. When only fifteen years of age he joined a troop of horse and took part in Gen. Greene's campaign, acting as quartermaster. After the war, entering the College of New Jersey, he taught the lower classes while studying in the higher. Graduating in 1785, he studied law at Charleston, S. C., and settled in the interior of the State. Having published a series of newspaper articles on proposed changes in the State constitution, he was soon after elected to the State legislature. In 1794 he entered Congress, where he was soon distinguished by his able support of the Federal policy of Washington and Adams. He retired from Congress in 1801, when the Federalists lost their power. He then married the daughter of Charles Carroll, of Carrollton, and settled in Baltimore. He gained further eminence as an advocate, and especially by his successful defence of Judge Samuel Chase when impeached by the House of Representatives. (See Chase, Samuel.) In 1815 the legislature of Maryland elected Harper to the U. S. Senate for an unexpired term. In 1819 he went abroad and made a long sojourn in England, France, and Italy. After his return his public services were in behalf of the Colonization Society, whose plans he ardently advocated. He also promoted canals and internal improvements. He died at Baltimore, Jan. 15, 1825. His widow survived until February, 1861. A volume of Harper's *Speeches* was published in 1814, and he issued political pamphlets at various times.

HARRIS, Samuel, an American theologian, was born at East Machias, Maine, June 14, 1814. He graduated at Bowdoin College in 1833, and studied theology at Andover. He was principal of academies in Maine until 1841, then pastor of the Congregational church at Conway, Mass., 1841–51, and at Pittsfield, Mass., 1851–55. He was made professor of systematic theology in Bangor Theological Seminary, Maine, in 1855, president of Bowdoin College in 1867, and professor of systematic theology in Yale Theological School, New Haven, Conn., in 1871. He has published *Zaccheus, or the Scriptural Plan of Benevolence* (1847); *Christ's Prayer for the Death of His Redeemed* (1861); *Christian Doctrine of Human Progress* (1870); *Kingdom of Christ on Earth* (1874); *Philosophical Basis of Theism* (1883).

HARRIS, Samuel Smith, an American bishop, was born in Autauga co., Ala., Sept. 14, 1841. He graduated at the University of Alabama in 1859, was admitted to the bar and practised law at Montgomery, Ala. During the civil war he served with distinction in the Confederate army, and afterwards resumed the practice of law in New York city. He took orders in the Protestant Episcopal Church in 1868, and had charge of churches in Alabama until 1879, when he was elected bishop of Michigan, being consecrated Sept. 17, 1879. He has published *The Relation of Christianity to Civil Society* (1883).

HARRIS, Thomas Lake, an American social reformer, was born at Fenny Stratford, England, May 15, 1823. At the age of four he was brought to America by his father, who settled at Utica, N. Y. He was soon compelled to earn his own living, and at seventeen he began to write for newspapers. Having renounced the Calvinistic faith in which he was early trained, he became a Universalist preacher at Minden, N. Y., in 1844. His health failing he went to Charleston, S. C., but from 1845 to 1847 was pastor of a church in New York city. In 1848, having adopted Swedenborgian views, he organized an Independent Christian Society in New York, but in 1850 joined a community at Mountain Cove, Va. He afterwards lectured in many parts of the Union, endeavoring to turn the public interest in spiritualism to what he considered a higher plane of religious thought and life. In 1855 he established the *Herald of Light* to advance his views, and in 1858 he visited England and

Scotland, where he gained converts. Returning in 1861 he settled in Amenia, N. Y., where several friends gathered around him and formed the "Brotherhood of the New Life." The settlement was afterwards removed to Brocton, N. Y., where Lady Oliphant and several Japanese of distinction joined the society, which had no written creed or form of government. The property was not held in common; each labored for himself. The Bible and the marriage relation are held in reverence by the "Brotherhood." More than 2000 members, scattered over the world, are said to belong to this unique society. About 1876 Mr. Harris removed to the neighborhood of Los Angeles, Cal., where he lives a retired life. His principal works are *Wisdom of Angels* (1856); *Arcana of Christianity* (1857, 1866); *Modern Spiritualism* (1869); *Millennial Age* (1860). He has also published several volumes of hymns and poems.

HARRIS, Thaddeus William (1795–1856), an American entomologist, was born at Dorchester, Mass., Nov. 12, 1795. He was the son of Rev. Thaddeus Mason Harris, D. D. (1768–1842), a Congregational clergyman of considerable note, who was pastor of the church in Dorchester for 46 years. The son graduated at Harvard in 1815, studied medicine and practised in Milton, Mass. He was librarian of Harvard College from 1831 till his death, and also taught botany and natural history in the college. In 1837 he was a member of a commission for the zoölogical and botanical survey of Massachusetts. His collection of North American insects was purchased by subscription for the Boston Society of Natural History. He took much interest in antiquarian researches. He died at Cambridge, Mass., Jan. 16, 1856. His chief publications were a *Catalogue of the Insects of Massachusetts* (1832); *Insects of New England Injurious to Vegetation* (1841; enlarged editions, 1852, 1862). His *Entomological Correspondence* was published in 1869, with a memoir by T. W. Higginson.

HARRIS, William Torrey, an American philosopher and educator, was born at North Killingly, Conn., Sept. 10, 1835. He entered Yale College in 1854 but did not graduate, though in 1869 he received the honorary degree of A. M. In 1857 he became a teacher in St. Louis, and in 1867 was made superintendent of public schools there. In 1875 he was chosen president of the National Educational Association. In 1866 he assisted in founding the Philosophical Society at St. Louis, and in 1867 he founded the *Journal of Speculative Philosophy*, which he has since edited. In 1880 he removed to Cambridge, Mass., where he still resides. His educational articles and reports have been received with marked attention in both Europe and America. In philosophy he is a Christian Hegelian. He has published some school-books, which are extensively used, and prepared for the International Expositions at Vienna and Paris the *Statement of the System of Education of the United States.*

HARRISBURG, the capital of Pennsylvania and county-seat of Dauphin county, is finely situated on the left bank of the Susquehanna River, 106 miles W. by N. of Philadelphia, and 125 miles by rail N. of Washington, D. C. It is on the main line of the Pennsylvania Railroad, here crossed by the Northern Central Railroad. The Cumberland Valley Railroad extends hence southwestward to Martinsburg, W. Va. Harrisburg is also on a branch of the Philadelphia and Reading Railroad. The Harrisburg and Potomac and the Gettysburg and Harrisburg Railroads make connections outside the city limits, and a short branch railway extends from Harrisburg to Steelton. The river, here a mile wide, is crossed by fine railway and other bridges. A park of 12 acres contains the capitol and other State buildings. Harrisburg has a court-house, county-prison, State arsenal, State insane-asylum, and a hospital. Among the numerous churches is the Roman Catholic Cathedral. The State library, founded before 1777, has over 45,000 volumes. Harrisburg has very large manufacturing interests, especially in the production and working of steel and iron; machinery, boilers, castings, nails, and files, are among the goods produced, as also cotton-goods, brooms, tiles, bricks, shoes, leather, carriages, flour, and lumber. The river and the Pennsylvania Canal bring down large quantities of pine and hemlock lumber, to be distributed from this point. The town was named from John Harris, who settled here in 1726, but Harrisburg was not regularly founded before 1785. It was incorporated in 1791; became the State capital in 1812, and was chartered as a city in 1860. Population in 1870, 23,104; in 1880, 30,782; beside 5000 inhabitants of the close suburbs.

HARRISON, Benjamin (1740–1791), an American statesman, was born at City Point, Va., in 1740. He studied at William and Mary College, but did not graduate. He was elected to the State legislature in 1764, and was a member of the committee which prepared the memorials to the king, lords, and commons. He was afterwards speaker of the house, and a member of all the State conventions held until the government under the Constitution was established. He was a delegate to the Continental Congress of 1774, and was one of the signers of the Declaration of Independence. He served as chairman of the Board of War, but in 1777 resigned his seat in Congress. Being then elected to the Virginia house of burgesses, he was chosen speaker and retained this position till 1782, when he became governor of the State and held this office till 1785. He was a delegate to the State convention of 1788 which ratified the Constitution of the United States, and opposed its adoption unless it should be amended. He died at City Point, Va., April, 1791. His son, William Henry Harrison, became the ninth President of the United States. (See HARRISON, WILLIAM HENRY, in the ENCYCLOPÆDIA BRITANNICA.)

HARRISON, Benjamin, twenty-third President of the United States, is the grandson of Pres. W. H. Harrison, and was born at North Bend, on the Miami River, Ohio, Aug. 20, 1833. He graduated at Miami University in 1852, and became a lawyer at Indianapolis in 1854, having already married Miss C. W. Scott, daughter of Dr. John W. Scott, the principal of an academy. In 1860 he was elected reporter of the State Supreme Court, but in July, 1862, he recruited the 70th Indiana regiment and became its colonel Aug. 7th. He joined Gen. Rosecrans' army at Murfreesboro, but was chiefly at Nashville until early in 1864, when he joined Gen. W. T. Sherman's march to Atlanta. His gallantry was conspicuous at Resaca, Kulp's Hill, and Peach Tree Creek. In the fall of 1864 he was renominated as reporter, returned to take part in the political campaign, and was again elected. His next military service was in the defence of Nashville against Hood, but he afterwards rejoined Sherman in North Carolina. He was brevetted brigadier-general March 22, 1865, and mustered out June 8. He returned to the practice of his profession and was also active in political affairs. In 1876 he was Republican candidate for governor of Indiana, but was defeated. In 1880 he was chosen U. S. Senator, but in 1885 he was defeated for re-election. In spite of these defeats he was generally acknowledged to be the leader of his party in the doubtful State of Indiana. In 1888 he was the Republican candidate for President and **was elected after an animated campaign.**

HART, Joel T. (1810–1877), an American sculptor, was born in Clark co., Ky., in 1810. He attended school only a few months, but was fond of reading. While working as a stone-cutter at Lebanon, Ky., he began to model busts in clay. He received encouragement from prominent citizens, and in 1849 went to Florence, Italy, where he executed a marble statue of Henry Clay, which was erected in Louisville, Ky. He also produced a bronze statue of Clay, which was set up in New Orleans. His ideal works, Angelica, Woman Triumphant, and Il Penseroso, show delicate perceptions of beauty and skill in expressing them, but he excelled in portrait-busts. He died at Florence, Italy, March 1, 1877.

HART, John (1708–1780), an American patriot, was born at Hopewell, N. J., in 1708. He was the son of a farmer, and followed the same calling. For several years he was a member of the provincial congress, and was distinguished for his patriotism and integrity. In June, 1776, he was chosen a delegate to the Continental Congress, in which he signed the Declaration of Independence. In 1777–78 he was a member of the New Jersey council of safety, and suffered much from the loyalists, who drove him from his home. But the capture of the Hessians by Washington enabled him to return and spend the remainder of his life in quiet. He died at Hopewell, N. J., in 1780.

HART, John Seely (1810–1877), an American author, was born at Stockbridge, Mass., Jan. 28, 1810. His father's family removed to Wilkes-Barre, Pa., where he was brought up. He graduated at Princeton in 1830, and after teaching for a year at Natchez, Miss., became in 1832 tutor of ancient languages at Princeton, and in 1834 adjunct-professor. From 1836 to 1841 he was principal of Edgehill School at Princeton; from 1842 to 1859 principal of the Philadelphia High School. He then resigned, and became editor of the publications of the American Sunday-School Union. In 1863 he was made principal of the New Jersey State Normal School at Trenton. In 1872 he became professor of rhetoric and the English language at Princeton. He died at Philadelphia, March 26, 1877. He was a frequent contributor to periodicals, and edited some literary magazines and illustrated annuals. He published *Spenser and the Faery Queen* (1847), several text-books on English grammar, literature, rhetoric, and composition, and some religious works.

HART, Solomon Alexander, an English painter of Jewish descent, was born at Plymouth, in April, 1806. His father, Samuel Hart, had studied painting under Northcote, and in 1820 settled in London. Solomon studied at the Royal Academy, and in 1826 exhibited a miniature of his father, but his first oil-painting, Instructions, was exhibited in 1828. He devoted himself chiefly to historical painting, and in 1840 was made an academician. Visiting Italy in 1841, he made drawings of many places of historical note, which he afterwards used in his paintings. In 1857 he was made professor of painting in the Royal Academy, and in 1865 became its librarian. Among his works are Wolsey and Buckingham (1834); Cœur de Lion and Saladin, Milton Visiting Galileo in Prison, Raphael and Pope Julius II.

HARTE, Francis Bret, an American poet and humorist, was born at Albany, N. Y., in 1837. At the age of 17 he went to California, where, after some experience of life in mining towns, he became editor of a paper in San Francisco. From 1864 to 1870 he was secretary of the U. S. Mint in that city, and in 1868 he was made editor of the newly-founded *Overland Monthly*. In its pages first appeared those vivid, dramatic sketches of California mining-life which have given their author world-wide reputation. The first was "The Luck of Roaring Camp;" then followed "The Outcasts of Poker Camp" and "Tennessee's Partner." Even more widely read were his verses on "The Heathen Chinee," which the author afterwards was reluctant to admit to his *Complete Poetical Works* (1873). In 1871 Mr. Harte removed to Boston, where he was a leading contributor to the *Atlantic Monthly*. He has since been U. S. consul in Germany and Scotland. One of his earliest publications was *Condensed Novels* (1867), containing caricatures of the principal novelists of the time. In later years his poetry has been chiefly in a serious vein, but his idyls of California life still continue his masterpiece.

HARTFORD, the capital of Connecticut and the county-seat of Hartford county, is on the W. bank of Connecticut River, at the head of regular steam-navigation, 50 miles from its mouth. It is on the New Haven, Hartford, and Springfield Railroad, here crossed by the main line of the New York and New England Railroad, of which a branch runs to Springfield. It is also a terminus of the Hartford and Connecticut Valley and the Connecticut Western Railroads. Railway and carriage bridges connect the city with the quaint and sleepy old town of East Hartford, with its wide and densely shaded main street, a typical New England village. Hartford mostly occupies a high and diversified site, and is in the main a remarkably compact and well-built city, the number of fine public and private buildings being unusually large. Among the public buildings and institutions are the splendid marble State-house (a Gothic structure); Trinity College (Episcopal), which occupies very handsome and commodious buildings; the Connecticut Theological Institute (Congregational); the State Asylum for Deaf-mutes; the Connecticut Retreat for the Insane; the city high and grammar school, with a noble building; the Wadsworth Athenæum, containing the Watkinson library of reference (35,000 volumes), the library of the Young Men's Institute (31,000 volumes), and the valuable library (20,000 volumes) and collections of the Connecticut Historical Society, as well as a picture-gallery and a collection of statuary; the city hospital, orphan asylum, State library; the U. S. building, including post-office, court-rooms, etc.; the State arsenal; the county buildings, etc. Many of the banks, stores, insurance companies, and churches have buildings of great architectural merit.

Hartford has an extensive wholesale and retail trade, and is especially distinguished for its large number of companies for life, accident, and fire insurance. It is also a great centre of the subscription-book business. Commercially it is noted as the principal seat in New England of the trade in leaf-tobacco. It has about 40 churches, among them a cathedral, the city being the see of a Roman Catholic bishop. The water-supply is ample, and the principal streets are substantially paved. Hartford is the seat of important and varied manufactures, the principal industrial establishment within the city limits being the extensive works of the Colt fire-arms company. The city is a centre for the offices of the numerous manufacturing establishments of the Connecticut Valley, some of which have handsome warehouses in the city. As a centre of large wealth and social culture, Hartford has attracted many persons of literary distinction.

Hartford was named after Hertford, in England. The Dutch built a fort here in 1633; but in 1635 was occupied by English immigrants from Massachusetts. In 1637 its name was changed from Newtown to Hartford. Its city charter dates from 1784. It shared with New Haven the honor of being the State capital until 1873, when it became the sole capital. The population in 1870 was 37,180; in 1880, 42,015.

HARTINGTON, Spencer Compton Cavendish, Marquis of, an English statesman, was born July 23, 1833. He is the eldest surviving son of the seventh Duke of Devonshire, and was educated at Trinity College, Cambridge, where he graduated in 1854. He accompanied Earl Granville to Russia in 1856 to attend the coronation of the Emperor Alexander II. In March, 1857, he entered Parliament as a representative of North Lancashire. He is a Liberal in politics, and in 1859 moved the vote by which Lord Derby lost the control of the government. In March, 1863, Lord Hartington was appointed a lord of the admiralty, and soon after under-secretary of war. In February, 1866, when Lord Russell's ministry was reconstructed, he was made secretary of war, and he went out of office with his colleagues in the following July. In December, 1868, Lord Hartington was defeated in North Lancashire, but being made postmaster-general in Mr.

Gladstone's cabinet he was elected from Radnor. In January, 1871, he was made chief-secretary for Ireland, and held that post until 1874, when the Liberals again lost their power. In 1875, when Mr. Gladstone sought to retire from the leadership of that party, the Marquis of Hartington was appointed to succeed him. But when in 1880 the same party was restored to power, chiefly through the remarkable Mid-Lothian campaign of Mr. Gladstone, the latter again took the helm of affairs. Lord Hartington was then made secretary of state for India, and was re-elected from Lancashire. He retired with Mr. Gladstone in 1885, but in February, 1886, did not resume his place, being opposed to the concessions made to Parnell's demands. The Marquis of Hartington is faithful in his devotion to public duty, and earnest in his advocacy of Liberal principles. He has twice been chosen rector of Edinburgh University.

HARTMANN, Karl Robert Eduard von, a German philosopher, was born at Berlin, Feb. 23, 1842, being the son of Gen. Robert von Hartmann. In 1858, having finished his course at the gymnasium, he entered the artillery service. In consequence of a severe injury to the knee, he was compelled in 1865 to retire from military duty, and henceforth devoted himself to philosophy. His first work, *Die Philosophie des Unbewussten* (1869), has attained a remarkable popularity, having passed through nine editions. Proceeding from Schopenhauer's doctrine of the irrational will and Hegel's of the absolute idea, Hartmann sets forth both as necessary to the true philosophy of the world. Both the will and the idea are attributes or functions of the same unconscious spirit, and the world is their product. Hartmann's works show deep insight into the workings of the human spirit, and constant endeavor to find corroboration for his philosophic theories in the physical sciences. His early acceptance of Schopenhauer's pessimism has been modified somewhat by the doctrine of evolution. His theory of ethics is presented in *Phœnomenologie des sittlichen Bewusstseins* (1879), and his philosophy of religion in *Das religiöse Bewusstsein der Menschheit* (1880), and in *Die Religion des Geistes* (1882). Hartmann has been indefatigable as a writer on all the political, educational, and social questions of the day, which he has treated with reference to his philosophical principles. He has also criticised freely the works of other philosophers, and has engaged in many controversies. Among his works are *Dramatische Dichtungen von Karl Robert* (1871).

HARTRANFT, John Frederic, an American general, was born at New Hanover, Pa., Dec. 16, 1830. He graduated at Union College, N. Y., in 1853, and was admitted to the bar at Norristown, Pa., in 1859. On the outbreak of the civil war he was colonel of militia, and was made colonel of the Fourth Pennsylvania regiment, which enlisted for three months. He was a volunteer aide to Gen. W. B. Franklin at the first battle of Bull Run. As colonel of the Fifty-first Pennsylvania volunteers he accompanied Gen. Burnside in his expedition to Roanoke Island in February, 1862; in August he commanded a brigade under Gen. Pope, at second Bull Run; in September, under Gen. McClellan, fighting at Antietam; and in December, under Gen. Burnside, at Fredericksburg. He was afterwards transferred to Kentucky, and in June, 1863, commanded a brigade before Vicksburg. Afterwards, at the siege of Knoxville, Tenn., he assisted in repulsing Longstreet. He was commissioned a brigadier-general May 12, 1864, and served through, under Gen. Grant, from the battle of the Wilderness to the capture of Richmond. In October, 1865, he was elected auditor-general of Pennsylvania, and served two terms. In October, 1872, he was elected governor of Pennsylvania, and served two terms. The principal events of his administration were the revision of the State constitution, the celebration of the Centennial anniversary of the Declaration of American Independence by the International Exhibition at Philadelphia, from May 10 to Nov. 10, 1876; and the railroad strike of July 17–Aug. 4, 1877, in which the depot at Pittsburg was destroyed. Gov. Hartranft, who had gone on a summer excursion to the Pacific coast, promptly returned, and ordering out the militia soon restored quiet. On the expiry of his term he settled in Philadelphia, and in 1880 was appointed postmaster of Philadelphia. From 1882 to 1885 he was collector of the port of Philadelphia.

HARTSHORNE, Edward (1818–1885), an American physician, was born at Philadelphia, May 14, 1818, being the son of Dr. Joseph Hartshorne (1779–1850), also a distinguished physician. He graduated at Princeton College in 1837, and studied medicine at the University of Pennsylvania. He was resident surgeon at the Pennsylvania Hospital (1841–43), and afterwards physician of the Eastern State Penitentiary at Philadelphia. He then travelled in Europe, observing especially the hospitals, asylums, and prisons, and on his return engaged in general practice in Philadelphia. He became an attending surgeon at the Pennsylvania Hospital, and during the civil war served as consulting surgeon in army hospitals, and in connection with the U. S. Sanitary Commission. He held many offices of trust and honor in his profession. He contributed to the *American Journal of the Medical Sciences* and other medical periodicals, and edited Taylor's *Manual of Medical Jurisprudence*. He died June 22, 1885.

HARTSHORNE, Henry, an American physician and poet, brother of the preceding, was born at Philadelphia, March 16, 1823. He graduated at Haverford College in 1839, and studied medicine in the University of Pennsylvania. He was professor of the practice of medicine in Pennsylvania College in 1859, and in 1865 was made professor of hygiene in the University of Pennsylvania. He also held other professorships in Haverford College and in the Woman's Medical College of Pennsylvania. He contributed to various medical periodicals, and became editor of the *Friends' Review* in 1874. His professional works include a *Conspectus of the Medical Sciences* and *The Principles and Practice of Medicine*. He also published *Summer Songs* (1865).

HARVARD COLLEGE, in Cambridge, Mass., was founded in 1636, six years after the settlement of Boston. In that year the legislature of the colony of Massachusetts Bay voted £400 to establish a college, and in 1637 chose Newtown, across the Charles River, as a site, because the town was near enough to the capital to be safe against the attacks of the Indians. In 1638 Rev. John Harvard, a Puritan clergyman, who had come to New England in 1637, left in his will £779 and his library of 300 volumes to aid the proposed college, which as yet existed only on paper. By his generous act the authorities were enabled to open the college at once, and gave it, out of gratitude to its first benefactor, the name of Harvard. At the same time the name of the town was changed to Cambridge, in memory of the university town in England where John Harvard and many of the earlier colonists had received their education.

See Vol. XI. p. 447 Am. ed. (p. 500 Edin. ed.).

In 1650, under the first president, Rev. Henry Dunster, the college received its first charter from the legislature. By the terms of this charter the government of the college and the management of its financial affairs were intrusted to the corporation, composed of the president, five fellows, and the treasurer. In certain cases, however, the corporation were obliged to obtain the consent of the board of overseers, which had been in existence for some time before the grant of the charter. This board consisted of the governor, lieutenant-governor, and the magistrates of the jurisdiction, and the elders of the churches of the six neighboring towns. The history of the college has been the effort to rid the board of overseers first of its religious and then of its political element, and to make it, the board, representative of a university. The charter of 1650, with the constitution it enforced, remained in effect with various modifications until 1865.

In the colonial period of its existence the avowed object of Harvard College was to train men for the ministry. A printing-press was early established for the spread of religious books, and here in Cambridge John Eliot printed his Indian translation of the Bible. Of the few Indians, however, who were attracted to the college only one graduated. The Quinquennial Catalogue still contains under the class of 1665 the name of "Caleb Cheeshahteaumuck Indus." In the earlier years the president and two tutors were considered enough to manage the college, and the number of the students was in proportion between 20 and 30. As fully one-half of these became clergymen, the course of study was largely theological in character. From the influence of the clergy at that time throughout New England the college was thus brought into intimate relations with the people. During this colonial period, to the year 1692, the gifts amounted to $32,000 and 1744 acres of land, and the grants of the legislature to $14,000.

In the provincial period, from the end of the colonial government in 1692 to the Revolution, the college gradually underwent a change. It still retained its theological character, but in a more liberal form. It sent forth fewer ministers in proportion to the number of students and altered the course of study to suit the demands for a more secular form of education. Latin was given up as the spoken language of the college. In 1740 Whitefield, the famous Methodist preacher, had no hesitancy in boldly charging the college with a want of religion, so little was the tendency of the age understood. The increasing toleration is well shown in the donations of Thomas Hollis, a London merchant, for the endowment of a professorship of theology in 1722 and of a professorship of mathematics in 1726. A Baptist and a man of liberal views, Hollis required the incumbent of his endowment to accept no particular form of belief beyond the Christian religion. Beside the gifts of Hollis and his family, who deserve to rank among the greatest benefactors of the college, chairs were endowed by Thomas Hancock and three other Boston merchants. From this period date the first college buildings, which are still standing, six in number; one of which was built to replace a building destroyed by fire while occupied by the general court. The number of students gradually increased, until by the time of the Revolution it had reached 160. The corresponding increase in the number of teachers led in 1725 to the formation of all the instructors into a faculty, which had charge of the interior organization of the college. At the outbreak of the war for independence the college was removed to Concord for two years (1774–76), though the number of students was not materially diminished. During the siege of Boston, General Washington occupied Cambridge as the American head-quarters and received from the college the first honorary degree of LL. D. The gifts during the provincial period were about $72,000 in money and 3113 acres of land, and the grants of the legislature amounted to about $100,000.

The national period, from the Revolution to the civil war, represents the final change of the college into a university. The prescribed course of study, which in the earlier years led to the ministry as its end, was gradually widening into a broad field which should teach all the subjects properly belonging to a liberal education. This change was not accomplished without difficulty, and naturally the first reform came in the nature of the governing board. By the charter of 1650 the government was lodged in the hands of the statesmen and ministers of the colony. The time had gone by, however, when these two classes monopolized the best men in the community. In 1810 an amendment to the State constitution allowed the board to consist of 15 laymen and 15 Congregational ministers. But in 1842, after a long struggle, this sectarian distinction was abolished, and ministers belonging to other faiths than the Congregational were made eligible for the board of overseers. Finally, in 1851, all religious restrictions were removed, and the board was allowed to be composed of ministers and laymen alike, one-sixth to be renewed every year.

Hand-in-hand with the abolition of sectarianism went the question of a connection with the State. The same law, in 1851, which threw open the board to laymen, left the election of the overseers in the hands of the legislature. This connection with the State was early found to be an evil, and a law was passed in 1865 by which the election of overseers was placed in the hands of the bachelors of arts of four years' standing. Thus the college severed the last link which bound it to the church and State, and passed under the control of its graduates.

During this national period the transition from a college to a university led to the addition of various departments to the old academical instruction. In 1783 the medical school was founded, and removed to Boston in 1810, in order to take advantage of a wider field for practice. The divinity school, as a separate department, dates from 1815. The law school was opened in 1817. In 1847 a large donation by Abbott Lawrence resulted in the foundation of the Lawrence Scientific School. In 1805 the botanic garden was established, and in 1846 the observatory. One of the notable additions was made in 1859, when the museum of comparative zoölogy was founded, mainly through the efforts of the elder Agassiz. The last grant of the State was made in 1814, when an annual sum of $10,000 was appropriated for 10 years. Since then the university has relied on gifts from private individuals and the tuition-fees. Besides the endowment of many chairs, no less than 16 buildings were added to Harvard during this period (1776–1865), built partly through private gifts, partly by the corporation. From the first catalogue, published in 1819, we find the names of 388 students. During this century the instruction became more liberal.

The period since 1865 marks the existence of the university. During these years the growth has been rapid. Five new departments have been added. In 1866 the Peabody Museum was built from the fund given for that purpose by George Peabody. The dental school, with head-quarters in Boston, was established in 1868, and the Bussey Institution, a school of agriculture in Jamaica Plain, near Boston, in 1871. In 1872 the Arnold Arboretum was founded, as the nucleus of a school of forestry. The last addition is the veterinary school, which was started in Boston in 1882. Thirteen new buildings have been added to the university, besides five dormitories, which are owned by private individuals. Of these buildings two deserve special notice. Memorial Hall, built in 1873 by subscription, commemorates the share which the graduates of the university bore in the war of 1861–65. It contains at one end a large dining-hall, capable of seating over 700 students, which is used as commons; and at the other, Landers Theatre, built after the form of a classic theatre, and seating 1300 persons, which is used for the commencement exercises and other solemnities of the university. The other building is the Hemenway Gymnasium, which is one of the leading institutions of the kind in the country. In 1886, under the presidency of Charles W. Eliot, LL. D., the number of students in all departments of the university is 1662 and the total number of teachers 184, besides 22 librarians, proctors, and other officers.

The treasurer's statement gives the funds of the university at nearly $5,000,000, and the income at over $600,000. The instruction is wholly elective, with the exception of certain prescribed courses in the freshman year. The rest of the work is left to the choice of the student under certain restrictions, and the last vestige of the old theological training has passed away.

(G. R. N.)

HASE, Karl August, a German theologian, was born at Steinbach, Saxony, Aug. 25, 1800. He was educated at Altenburg and at Leipsic, but being driven thence for taking part in the *Burschenschaft* disturbances, finished his studies at Erlangen. In 1823 he became a *privat docent* of theology at Tübingen, but was brought to trial on account of his old offence as a *Burschenschafter*, and imprisoned for eleven months. In 1830 he settled at Jena as professor of theology, and in 1883, after fifty-three years' service, was permitted to retire with various marks of honor. In 1844 he became one of the editors of the *Protestantische Kirchenzeitung*, the organ of the German rationalists. His numerous works have been directed chiefly to reconciling the Scriptures with the conclusions of modern science. His principal work is *Evangelische Dogmatik* (1825; 6th ed., 1870), to which *Gnosis* (3 vols., 1828; 2d ed., 1870) is a supplement. His *Leben Jesu* (1829) was translated into English by J. Freeman Clarke (1859), and has been enlarged by the author under the name *Geschichte Jesu* (1875). He has also published numerous historical and biographical sketches: *Neue Propheten* (1851); *Franz von Assisi* (1854); *Catarina von Siena* (1862); and has taken part in many controversies. His *Handbuch der protestantischen Polemik gegen die Roman-Katholische Kirche* (1863; 4th ed., 1878) is noteworthy. His *Ideale und Irrthümer* (1872) is an autobiography.

HASE, Karl Benedict (1780–1864), a German philologist, was born near Weimar, May 11, 1780. He studied theology and philosophy at Jena and Helmstedt, and in 1801 went to Paris, where in 1805 he obtained a position in the Imperial library. In 1816 he was made professor of Greek palæography and of modern Greek at the *École des langues Orientales*, in 1830 professor of German language and literature at the Polytechnic school, in 1832 keeper of manuscripts in the library, and in 1852 professor of comparative grammar in the University of Paris. He died at Paris, March 21, 1864. He was noted for his knowledge of the Byzantine historians. He edited *Leo Diaconus* (1819), and was the chief editor of a new edition of the Greek Lexicon of Stephanus, which was completed after his death by W. and L. Dindorf.

HASSLER, Ferdinand Rudolph (1770–1843), an American scientist, was born at Aarau, Switzerland, Oct. 6, 1770. He early attained a high reputation for mathematical ability, and was engaged in a trigonometrical survey of Switzerland. Removing to the United States, he was brought into notice by his fellow-countryman, Albert Gallatin, and became professor of mathematics at West Point in 1807. In the same year President Jefferson recommended the establishment of a national coast survey; Congress approved the suggestion and made an appropriation, and Secretary Gallatin invited plans for the prosecution of the work. That of Prof. Hassler was accepted, and in 1811 he was sent to Europe to procure the instruments necessary for the undertaking. In consequence of the war with Great Britain he was detained in Europe until 1815, but on his return he was made first superintendent of the survey. He began his operations with a survey of New York harbor, but before he had published the result of his first year's labor the whole work was suspended. He was afterwards made chief of the bureau of weights and measures, and in 1832, when the coast survey was resumed, Hassler was restored to his former position as superintendent. He continued to direct the work until his death, which occurred at Philadelphia, Nov. 20, 1843. He published some text-books on mathematics, *System of the Universe*, and many valuable reports. (See Coast and Geodetic Survey.)

HAUPT, Herman, an American general and engineer, was born at Philadelphia, March 26, 1817. He graduated at West Point in 1835, and entered the infantry service, but soon after resigned and became assistant engineer on the public works of Pennsylvania. In 1844 he was appointed professor of civil-engineering in Pennsylvania College. In 1847 he became principal engineer of the Philadelphia and Columbia Railroad, and in 1849 its superintendent. From 1856 to 1861 he was principal engineer of the Hoosac Tunnel, Mass. In the civil war he served first on the staff of Gen. J. McDowell, and had charge of the transportation service. He was afterwards made chief of the bureau of military railroads. Some of the devices which he put in operation in the army are described under Bridges, Vol. II., p. 645. After the war Gen. Haupt returned to the practice of his profession as a railroad engineer, and was connected with railroads in the Southern States and with the Northern Pacific Railroad. He has published several works, among which are *Hints on Bridge Building* (1840); *General Theory of Bridge Construction* (1853); *Military Bridges* (1864).

HAUSSMANN, Baron Georges Eugène, a French administrator, was born at Paris, March 27, 1809. After being trained as a musician, he became an advocate. Soon after the Revolution of 1830 he was made sub-prefect of Nérac (1833), and passed thence to St. Girons (1840) and Blaye (1842). Under the presidency of Louis Napoleon he held other prefectures, and after the establishment of the empire he was called to the prefecture of the Seine in June, 1853. He soon entered upon the vast system of public works by which the city of Paris was almost completely transformed. He turned the Bois de Boulogne into a public park, added numerous other parks in different directions, laid out the Boulevard de Sebastopol, then carried twenty boulevards through the old city, tore down old buildings, put up new hospitals, public halls, bridges, churches, theatres, and the gorgeous opera-house. The immense sums required for these purposes were obtained by successive loans contracted by the city of Paris. At last Baron Haussmann's financial administration became the subject of investigation by the *Corps Législatif* in 1869, and it was found that he had issued bonds far in excess of those legally authorized, yet a new issue of bonds was at once authorized, and subscriptions were received for five times the amount asked. On Jan. 5, 1870, he was removed by imperial decree, yet was pensioned. After the fall of the empire in September, he went abroad for some months, but in 1871, having returned, he was made a director of the Crédit Mobilier, and did much to restore its influence. After two failures to gain an entrance to the *Corps Législatif*, he was elected as a Bonapartist from Ajaccio, Corsica, in 1877. He took part only in the discussion of the finances and of public works. The municipal museum which he had established at the Hotel de Ville was destroyed with that building by the Communists in May, 1871. The *Histoire générale de Paris*, which was illustrated by this museum, was published in 16 volumes.

HAÜY, Valentin, Abbé (1745–1822), a French instructor of the blind, was born at St. Just, Nov. 13, 1745, being a brother of the celebrated mineralogist, R. J. Haüy. (See Encyclopædia Britannica.) He was a man of generous impulses, and becoming acquainted with a blind pianist was led to make the instruction of the blind his life-work. For this purpose he established schools, and though they had little success yet his invention of printing with raised letters for their use has made his name memorable. Although an abbé, he was not a priest, and was twice married. He died at Paris, June 3, 1822. He published an *Essai sur l'éducation des aveugles* (1786) and some other works.

HAVEN, Alice Bradley (1828–1863), an American author, was born at Hudson, N. Y., Sept. 13, 1828. Her name was originally Emily Bradley. While attending school she sent to the *Saturday Gazette*, of Philadelphia, sketches signed "Alice G. Lee." This led to an acquaintance with the editor, Joseph C. Neal, to whom she was married in 1846, having at his request assumed the name Alice. On his death a few months later she took charge of the literary department of the paper, and conducted it successfully until 1853, when she was married to Samuel L. Haven, and removed to Mamaroneck, N. Y. She still continued to write juvenile books, and poems and sketches for the magazines. She died at Mamaroneck, Aug. 23, 1863. Her publications include *The Gossips of Rivertown* (1850); *No Such Word as Fail* (1855); *Out of Debt, Out of Danger* (1861); *Lessons for Lent* (1867); *Home Stories* (1868).

HAVEN, Erastus Otis (1820–1881), an American bishop, was born at Boston, Mass., Nov. 1, 1820. He graduated at Wesleyan University, Conn., in 1842, and engaged in teaching at Sudbury, Mass. He was principal of Amenia Seminary, N. Y., from 1846 to 1848, when he entered the ministry in the Methodist Episcopal Church. After holding pastorates in New York, he was made professor of Latin in the University of Michigan in 1853, but in the next year was transferred to the chair of English literature and history. In 1856 he became editor of *Zion's Herald* at Boston, and held this position till 1863, being also in the meantime a member of the State Board of Education and a State senator. In 1863 he was recalled to the University of Michigan to be its president, and after six years' successful discharge of the duties of that position, was made president of the North-western University, Evanston, Ill., a denominational college. In 1872 he was elected by the General Conference secretary of the board of education, and in 1874 he was made chancellor of Syracuse University. In 1880 he was elected a bishop. While journeying on the Pacific coast in discharge of his duties, he died at Salem, Oregon, Aug. 2, 1881. He was an eloquent preacher and had great executive ability. He had been a member of five general conferences. He published a treatise on *Rhetoric* and other text-books, and after his death his *Autobiography* (1883) was edited by Rev. C. C. Stratton.

HAVEN, Gilbert (1821–1880), an American bishop, was born at Malden, Mass., Sept. 21, 1821. He graduated at Wesleyan University, Conn., in 1846, became professor in Amenia Seminary, N. Y., and then principal from 1848 to 1851. Having joined the New England Conference of the Methodist Episcopal Church, he became noted as a preacher, lecturer, and writer. He was an earnest opponent of slavery and of Romanism. In 1861 he served as chaplain of the Eighth Massachusetts regiment, and in 1862 went to Europe. On account of his interest in the colored people, he was sent on a special mission among the Southern freedmen at the close of the war. He was editor of *Zion's Herald* from 1867 to 1872, and was then elected bishop, with residence at Atlanta, Ga. He travelled extensively in discharge of his duty, visiting especially Mexico and Liberia. On his return from the latter, his health was impaired, and he died at Malden, Mass., Jan. 8, 1880. Besides some volumes of sermons he published *The Pilgrim's Wallet* (1864), relating his travels in Europe, and *Our Next-Door Neighbor* (1874), giving sketches of Mexico.

HAVEN, Joseph (1816–1874), an American clergyman, was born at Dennis, Mass., Jan. 4, 1816. He graduated at Amherst College in 1835, and studied in the Union Theological Seminary, New York, and at Andover. He became pastor of the Congregational church at Ashland, Mass., in 1840, and at Brookline, Mass., in 1846. He was appointed professor of moral and mental philosophy in Amherst College in 1850, and was called to be professor of systematic theology in the Chicago Theological Seminary in 1858. On account of ill health he resigned in 1870 and went to Europe. In 1874 he was appointed professor of mental and moral philosophy in the University of Chicago, and died there, May 23, 1874. He published *Mental Philosophy* (1837); *Moral Philosophy* (1859); *Studies in Philosophy and Theology* (1869); and many sermons and essays.

HAVERFORD COLLEGE, in the township of Haverford, Delaware co., Pa., 9 miles from Philadelphia, was founded in the year 1832 by prominent members of the Society of Friends, whose object was to provide a place for the instruction of their sons in the higher learning and for moral training, which should be healthful, agreeable, and sheltered from temptations. A farm was bought of about 220 acres, at an elevation of nearly 400 feet above tide-water, well furnished with springs and diversified with woods, fields, and meadows. A tract now consisting of upwards of 70 acres was set off by an experienced English landscape-gardener, and planted with a large variety of trees and shrubbery, constituting the academic grove in which the college buildings stand. This park is now the most beautiful which any American college can boast. The "Founders' Hall," a large and well-constructed building of stone, was finished in 1833, and in the autumn of that year Haverford School was opened. This modest title was borne for upwards of twenty years, although a full collegiate course of study was pursued from the beginning. Early in 1856 the institution was incorporated as a college, with the right of conferring academic degrees, which it first exercised at the commencement in that year.

Barclay Hall, built in 1876, a strikingly beautiful building of Port Deposit gneiss, 220 feet in length, and with a tower 110 feet high, furnishes studies and bedrooms. There are two astronomical observatories, one built in 1852, the other in 1884, containing a refracting equatorial telescope of 10 inches aperture, another of 8¼ inches aperture, and various instruments and appliances. The students have free access to the observatory, and enjoy opportunities for astronomical observation such as are seldom offered. A tasteful and well-proportioned building, of light-colored gneiss from the neighboring township of Upper Darby, contains the library and a hall used for addresses, society meetings, and the public exercises of the college. Here some 20,000 volumes are always ready for the use of the students, selected with great care in all departments of knowledge. A carpenters' shop was built soon after the opening of the institution, as a place where the students might find profitable exercise and amusement in the use of tools. This was fitted up in 1884 for the department of mechanical engineering then established, and contains a forge, steam-engines, and appropriate machines and tools.

The chemical laboratory was set up in 1833, in a room adjoining Founders' Hall. The present laboratory was built in 1853, and has several times been enlarged and improved. It is amply furnished and under skilful management. In Founders' Hall there is a museum of natural history and geology and a physical laboratory. This hall contains also the recitation-rooms and the dining-hall.

The college has always been famed for its healthiness, the consequence of its fortunate rural situation, the wholesome conditions of the students' lives, and their interest in cricket, foot-ball, and other games and various physical exercises. There is a well-furnished gymnasium, in which exercise is required of all the students under the direction of an experienced physician.

The officers in 1886 are as follows: president, Thomas Chase, LL. D., a graduate of Harvard University, who was a member of the American company of revisers of the translation of the New Testament, is the editor of a series of classical text-books very widely used, and has written many reviews, addresses, and literary articles; dean, Isaac Sharpless, Sc. D., the author of excellent text-books in astronomy, geometry, and physics; Pliny Earle Chase, LL. D., professor of philosophy and logic; Allen Clapp Thomas, A. M., professor of history and political science; Lyman Beecher Hall, Ph. D. of Göttingen, professor of chemistry and physics; Edwin Davenport, A. M. of Harvard, professor of Greek and of English composition; Seth K. Gifford, A. M., professor of Latin and German. There are other professors, distinguished in their respective departments, and several assistants.

The college is marked by certain special excellences, such as: First, good moral and religious influences. Endeavors are made to imbue the minds and hearts of the students with the truths of the Christian religion, and to inculcate pure morals under the restraints of a judicious discipline. Second, thorough scholarship. The teaching is of the highest quality. The classes are small enough to secure the regular performance of work and the opportunity for individual instruction. The absence of distractions, and the example and influence of the professors, enable a large amount of honest and fruitful work to be done. Third, the healthfulness and pleasantness of the student life.

In 1885 Jacob P. Jones, a prominent Friend and citizen of Philadelphia, bequeathed the greater part of his large estate to Haverford College, in accordance with a promise made fourteen years before. This endowment gives the assurance of largely increased usefulness and excellence.

HAVERGAL, Frances Ridley (1836–1879), an English poet, born at Astley, Worcestershire, Dec. 14, 1836, the youngest child of the Rev. Dr. W. H. Havergal (1793–1870), canon of Worcester, and a celebrated composer of church music. Educated in the best English and German schools, she early displayed remarkable talents as a pianist, organist, and singer; but the impulse for the poetical expression of her overmastering religious feelings gradually led her to the adopting the writing of devotional works as her life-work. She died at Caswell Bay, near Swansea, Wales, June 3, 1879. Among her many published books the most are devotional writings in prose and poetry, including *Little Pillows; The Ministry of Song; Morning Bells; Our Work and our Blessings; Under His Shadow; My King* (1877); *Kept for the Master's Use* (1879); *Swiss Letters* (1882). Miss Havergal's abilities as a poet were great, but in a literary point of view their effect is lessened by the intensity and seriousness of purpose which at all times underlie her writing. Her personal devotion to religious and charitable work was complete and unqualified; and her faith was of the kind that knows no doubts. The *Memorials* (1880) of her life, prepared by her sister, are of great interest.

HAVERHILL, a city of Massachusetts, in Essex county, is on the north side of the Merrimack, at the head of tide-water, 18 miles from its mouth, and 33 miles north of Boston. The city is 11 miles long and 3 miles wide. It is connected with West Newberry, Groveland, and Bradford by iron bridges. Settled in 1639, it was incorporated as a town in 1642, and as a city in 1870. Its principal business is the manufacture of shoes, there being 200 factories; but it has also an iron-foundry, 3 hat-factories, and glass-works. Its principal buildings are the city hall and academy of music. It has 10 hotels, 4 national banks, 2 savings banks, 4 weekly and 3 daily newspapers, 21 churches, a high school, and 29 other schools. It is lighted with gas, and is supplied with water from Keuga Lake and three other small lakes. Its property is valued at $14,293,932, and its debt is $339,696. The thickly settled part has suffered from two large fires in 1873 and 1882.

HAWEIS, Hugh Reginald, an English clergyman and author, was born at Egham, Surrey, April 3, 1838. He was educated at Trinity College, Cambridge, and graduated in 1859. After serving as curate of churches in London, he was in 1866 appointed incumbent of St. James' Church, Marylebone, where, besides the customary church services, he established others for the benefit of non-church-goers. He has been active in movements to diffuse information among the lower classes, such as "Penny Readings." He has also advocated the opening of museums on Sundays. He has been a frequent contributor to the magazines, and in 1868 was made editor of *Cassell's Magazine.* He visited the United States in 1885 and lectured in the principal cities. He has published *Music and Morals; Speech in Season; Arrows in the Air.*

HAWES, Joel (1789–1867), an American clergyman, was born at Medway, Mass., Dec. 22, 1789. He graduated at Brown University in 1813, and studied theology at Andover. He was ordained pastor of the First Congregational Church, Hartford, Conn., in March, 1818, and held that position till his death at Gilead, Conn., June 5, 1867. He was very popular both as preacher and writer. Among his works are *Lectures to Young Men on the Formation of Character* (1828); *The Religion of the East* (1845); *An Offering to Home Missionaries* (1865).

HAWKS, Francis Lister (1798–1866), an American clergyman, was born at New-Berne, N. C., June 10, 1798. He graduated at the University of North Carolina in 1815, studied law, and was successful in practice. In 1827 he was ordained to the ministry in the Protestant Episcopal Church, and became assistant in churches at New Haven, Conn., and in Philadelphia. In 1830 he was chosen professor of divinity in Washington (afterwards Trinity) College, Hartford. In 1831 he became rector of St. Stephen's Church, New York, and in 1832 of St. Thomas' Church, where he officiated until 1843. Dr. Hawks was, in 1835, appointed by the General Convention historiographer of the American Episcopal Church, and therefore visited England, where he obtained many important documents. In 1839 he established at Flushing, on Long Island, a school for boys, but through its failure became deeply involved in debt. In 1843 he spent some time in Mississippi and was elected bishop of that diocese, but declined the office as he had in 1835 declined that of missionary bishop of the South-west. He was rector of Christ Church, New Orleans, from 1844 to 1849, and was chosen first president of Louisiana University. In 1849 he returned to New York to become rector of Calvary Church, his pecuniary embarrassments having been relieved by subscription. On the outbreak of the civil war Dr. Hawks, on account of his sympathy with the South, resigned his charge and in 1862 became rector of a church in Baltimore. At the close of the war he returned to New York, and was entering upon new work there when he died, Sept. 27, 1866. While practising law he had published some volumes of reports and a digest of cases decided in North Carolina. He afterwards published *Contributions to the Ecclesiastical History of the United States* (2 vols., 1836–41); *Commentary on the Constitution and Canons of the Protestant Episcopal Church* (1841); *Egypt and its Monuments* (1849); and *Documentary History of the Protestant Episcopal Church* (1863). He edited *Commodore Perry's Expedition to Japan* (1856); *Cyclopædia of Biography* (1856); *History of North Carolina* (1857), and other works.

HAWLEY, Joseph Roswell, an American statesman, was born at Stewartsville, N. C., Oct. 31, 1826. His father, Rev. Francis Hawley, a native of Connecticut, was a Presbyterian minister, and his mother was a native of North Carolina of Scotch descent. In 1837 the family removed to Connecticut, and about 1842 to Central New York. Joseph graduated at Hamilton College in 1847, studied law, and began practice at Hartford, Conn., in 1850. In the spring of 1857 he became editor of the *Hartford Evening Press*, a Republican paper just started. On the outbreak of the civil war he enlisted as a captain in a Connecticut regiment, and rose to the rank of brigadier-general and brevet major-general. He was mustered out of the service Jan. 15, 1866, and was elected governor of Connecticut in 1866. He was president of the Republican National Convention in 1868; secretary of the committee on resolutions in the Convention of 1872, and chairman of the similar committee in 1876. He was president of the U. S. Centennial Commission from its organization, in March, 1873, to the completion of the work of the Centennial Exhibition. He was elected to Congress in 1872 and twice re-elected. In 1881 he was elected to the U. S. Senate.

HAWTHORNE, JULIAN, an American novelist, son of the famous Nathaniel Hawthorne (for whom see ENCYCLOPÆDIA BRITANNICA), was born at Boston, Mass., June 22, 1846. He lived in and near Boston until June, 1852, when his father went to Liverpool, England, as American consul. He remained in Europe till 1860, and then returned to enter Harvard College, where he spent four years, but did not graduate. After another year at Harvard Scientific School, he went to Dresden, Germany, where he studied civil engineering. After his return to America in 1870 he was employed as an engineer in the department of docks, New York, under Gen. McClellan. He now began to contribute short stories to *Harper's Magazine.* While in Dresden in 1872–74 he published his first novels, *Bressant* and *Idolatry.* He resided in England from 1874 until 1882, when he returned to New York. Besides several short stories and a book of sketches called *Saxon Studies* he has published *Garth; Sebastian Strome; Dust; Fortune's Fool* (1883); *Beatrix Randolph* (1884). He has also published a biography, *Nathaniel Hawthorne and his Wife* (1884), and edited some of his father's writings.

HAY, JOHN, an American writer, born at Salem, Ill., Oct. 8, 1839. He graduated at Brown University in 1858; studied law, was admitted to the bar in 1861; was a private secretary, and afterwards aide-de-camp to Pres. Lincoln, 1861–65; serving for a time in the field, and attaining the rank of colonel and assistant adjutant-general. He was a secretary of the legation in Paris, 1865–67; *charge d'affaires* at Vienna, 1867–68; secretary of legation at Madrid, 1869–70; and in 1870 became a member of the editorial staff of the *New York Tribune.* His *Pike County Ballads* (1871), a widely-known series of dialect verses, and *Castilian Days* (1871), a prose work of merit, gave him a high reputation.

HAYDEN, FERDINAND VANDEVEER, an American geologist, was born at Westfield, Mass., Sept. 7, 1829, removed in early life to Ohio, graduated at Oberlin College in 1850, and took a degree at the Albany Medical College in 1853. In the same year began his career as an explorer of the Western Territories, and as a collector of fossil remains. These explorations were carried on for a time at his own expense, but in 1856 he received a staff appointment as geologist in the Topographical Engineers. In 1861 he entered the army medical service; became an assistant medical inspector in 1864, and was somewhat later made chief medical officer of the forces in the Shenandoah Valley. He was (1865–72) a geological professor in the University of Pennsylvania, still conducting surveys in the West. In 1867 he was placed in charge of the U. S. Geological Survey of the Territories. He published a series of *Reports* embodying the results of this survey.

HAYES, ISAAC ISRAEL (1832–1881), an American explorer, was born at Chester, Pa., March 5, 1832. He studied medicine at the University of Pennsylvania, graduating in 1853. Having become interested in the Arctic explorations of Dr. E. K. Kane, he was appointed surgeon in the second Grinnell expedition, and sailed in the Advance. This vessel was at last hemmed in with ice so that Dr. Kane decided to abandon it and march over the ice to Upernavik. Some of the party, among whom was Dr. Hayes, went to seek help from the Eskimo, spent three months with these people and then returned to the ship. Dr. Hayes had become convinced that there is an "Open Polar Sea," and after his return to the United States in 1855 presented his views in public lectures. With the aid of scientific societies he fitted out a new expedition in July, 1860, taking 14 persons in the schooner United States, 133 tons. He reached Melville Bay, Aug. 23, and spent the winter at Port Foulke on the west coast of Greenland. In the following spring, pushing northward with dog-sledges, he reached on May 18 land in N. lat. 81° 37′, beyond which he saw open water, but his provisions being exhausted was obliged to return. The schooner got free of the ice in the summer, and returned to Boston in October, 1861. The civil war had begun, and Dr. Hayes, entering the army as a surgeon, served till its close. In 1869 he made a voyage to the southern coast of Greenland. In 1875 he was elected to the assembly in New York, and continued to be a member until 1880. He died at New York Dec. 17, 1881. Besides magazine articles Dr. Hayes wrote *An Arctic Boat-Journey* (1860); *The Open Polar Sea* (1867); *Cast Away in the Cold*, a story (1868); and *The Land of Desolation* (1872).

HAYES, RUTHERFORD BIRCHARD, twentieth President of the United States, was born at Delaware, Ohio, Oct. 4, 1822. His father having died, his uncle, Sardis Birchard, gave him the means for a liberal education. Rutherford graduated at Kenyon College in 1842, studied law at Harvard College, and was admitted to the bar at Marietta, Ohio, in 1845. He removed to Cincinnati in 1850, and became prominent in his profession, and was city solicitor from 1859 till 1861. Soon after the outbreak of the civil war he was appointed major of the Twenty-third Ohio infantry, and served in West Virginia. In October, 1861, he was made lieutenant-colonel, and while commanding his regiment was wounded at South Mountain, Sept. 14, 1862. He was then made colonel and soon was in command of a brigade. He fought with great gallantry in the Shenandoah Valley in 1864, and for his services at Cedar Creek he received his commission as brigadier-general. Though then elected to Congress, he served in the field till the close of the war, having been wounded four times. He was re-elected to Congress in 1866, was elected governor of Ohio in 1867, and re-elected by an increased majority in 1869. He declined a nomination for this office in 1871, and in 1872 was defeated as a candidate for Congress. In 1875 he was again made Republican candidate for governor and he was elected. In 1876, at the National Republican Convention at Cincinnati, on the seventh ballot, Gov. Hayes was nominated by a combination of those opposed to Blaine. At the election in November following the popular vote was 4,284,757 for S. J. Tilden, the Democratic candidate, and 4,033,950 for Hayes; but when the electoral votes came to be counted by Congress it appeared that 184 Democratic electors and 172 Republican electors had been regularly certified as chosen, while there were conflicting returns in regard to 13 votes—4 from Florida, 8 from Louisiana, and 1 from Oregon; and there were also objections to the vote of South Carolina. As Congress found itself practically unable to determine the questions involved, it referred the matter to a special electoral commission devised for the occasion. This commission consisted of five Senators, five Representatives, and five Judges of the Supreme Court. After full argument on all the points, the Commission decided in every case by a majority of one that Congress was bound to accept the official returns of the State authorities as final. Congress in accordance with this decision found on March 2, 1877, that Hayes had received 185 electoral votes and Tilden 184. On March 4 Hayes was duly inaugurated as President.

At the outset of his administration he undertook to conciliate the people of the Southern States. As an earnest of this he made D. M. Key of Tennessee postmaster-general. The other positions in the cabinet were filled with prominent conservative Republicans. He appointed a number of Congressmen to visit and report on the measures necessary to restore peace and harmony in the South. In accordance with their advice he withdrew the U. S. troops who had been employed in upholding Republican State officers in South Carolina and Louisiana, and he recognized the Democratic State officers. Throughout his administration Mr. Hayes persevered in his course of conciliation towards the South, though strenuous opposition was made by the recognized leaders of the Republican party in Congress. The latter became known as "Stalwarts," and they applied to those who favored the President's policy the derisive epithet "Half-breeds." Yet the actual result of the President's efforts to allay strife in the South was a gradual restoration of the Republican party to the confidence of the people of the North, as was shown by the results of the elections in the latter part of Mr. Hayes' term and the election of his Republican successor without such dispute as had attended his own. The various branches of the administration had been wisely and economically managed and the country was steadily prosperous. Specie payments, which had been suspended in the first year of the civil war, were resumed on Jan. 1, 1879, without disturbance of the money-market. The laws guarding the public domain in the Territories were strictly enforced against spoliators, and though some troubles with Indians attracted the attention of the country, they were as fairly settled as the nature of the case permitted. Mr. Hayes retired from office with the satisfaction of having done much to promote the best interests of the people in all parts of the Union. Though since living in retirement, he has aided in benevolent work, especially the promotion of education among the freedmen of the Southern States.

HAYNE, Isaac (1745–1781), an American Revolutionary soldier, was born in South Carolina in 1745. When the British began a campaign in South Carolina in 1780, Hayne, then a senator in the State legislature, became a captain of cavalry. Being made prisoner at the capture of Charleston, May 12, 1780, he was paroled, but early in 1781 he was ordered either to take arms as a British subject or to return to Charleston as a prisoner. On being assured that he would not be required to bear arms against his countrymen, he signed a declaration of allegiance to the king. Afterwards, however, those who had formerly given their parole were required to perform military service, and rather than do this for the British, Hayne went to the American camp, and was commissioned as colonel. In July, 1781, he captured Gen. Williamson, a Scotchman by birth, who had gone over to the British. A large force was immediately sent out from Charleston, by which Hayne was captured. He was confined at Charleston until the arrival of Lord Rawdon, then condemned by a court of inquiry, and executed at Charleston, S. C., Aug. 4, 1781. Gen. Greene issued a proclamation Aug. 26, declaring his determination to make reprisals. The subject was discussed in the British Parliament, and Lord Rawdon published a justification of his conduct, which was afterwards criticised by Robert Y. Hayne in the *Southern Review*, February, 1828.

HAYNE, Paul Hamilton, an American poet, was born at Charleston, S. C., Jan. 1, 1831. He was a son of Lieut. Hayne, U. S. N., and nephew of the distinguished statesman, Gov. R. Y. Hayne (for whom see Encyclopædia Britannica). Paul was educated at Charleston, and was a frequent contributor to the *Southern Literary Messenger*. He published a volume of poems in 1855, the longest being "The Temptation of Venus." A second volume, *Sonnets, and other Poems*, followed in 1857, and a third, *Avolio, and other Poems*, in 1859. During the civil war Hayne wrote some fiery poems, which were reprinted in Simms' *War Poetry of the South*. Since that time he has published *Legends and Lyrics* (1872), and has edited the *Poems of Henry Timrod* (1873). Short poems continue to appear from his pen in the prominent literary periodicals. He died July 6, 1886.

HAYS, Isaac (1796–1879), an American physician, was born at Philadelphia, July 5, 1796. He graduated at the University of Pennsylvania in 1816, where he also received the degree of M. D. in 1820. He had an extensive practice, and was especially noted as an oculist. He became editor of the quarterly *American Journal of the Medical Sciences* in 1820, and had sole charge of it until 1869, when he associated with him his son, Dr. I. Minis Hays, who still edits the periodical. Dr. Hays also established in 1843 a monthly called *Medical News*, and in 1874 the *Monthly Abstract of Medical Science*. He also edited *Wilson's American Ornithology* (1828), and a number of medical works. He framed the code of ethics of the American Medical Association, which has been adopted by every State and county medical society in the Union. He was a member of many learned societies, and president of the Philadelphia Academy of Natural Sciences from 1865 to 1869. He died at Philadelphia, April 12, 1879.

HAZARD, Rowland Gibson, an American manufacturer and philosopher, was born at South Kingston, R. I., Oct. 9, 1801. He has been engaged from his youth in manufacturing pursuits, and has accumulated a large fortune. While in New Orleans, in 1841, he secured the release of a large number of free negroes who, belonging to vessels from the North, had been placed in the chain-gang. He was elected to the State legislature in 1851 and 1854, and to the State senate in 1866. He has published many treatises, among which are *Essay on Language* (1834); *Adaptation of the Universe to the Cultivation of the Mind* (1840); *Decline of Political and National Morality* (1841); *Philosophical Character of Channing* (1844); *Railroad Corporations and the Public* (1849); *Resources of the United States* (1864); *Freedom of the Mind in Willing* (1864); *Causation and Freedom* (1869).

HAZARD, Samuel (1784–1870), an American antiquarian, was born at Philadelphia, May 26, 1784, being the son of Ebenezer Hazard (1745–1817), the first postmaster-general of the United States. He was engaged originally in mercantile pursuits, and made many voyages to the East Indies. Afterwards he devoted himself to compiling and editing documents relating to the early history of Pennsylvania. Among these are *Pennsylvania Register* (16 vols., 1828–36); *Annals of Pennsylvania*, 1609–82 (1850); *Pennsylvania Archives*, 1682–1790 (12 vols., 1853). He died at Philadelphia, May 22, 1870.

HAZEN, William Babcock, an American general, was born at West Hartford, Vt., Sept. 27, 1830. He is a descendant of Gen. Moses Hazen (1733–1803), who served in the French war (1756–63), and afterwards in the Revolutionary war. William's parents removed to Huron, Ohio, in 1833. He graduated at West Point in 1855, and entering the Eighth infantry served against the Indians in California, Oregon, and Texas. In February, 1861, he was appointed assistant professor of infantry tactics at West Point, and in May was made captain. He took command of the Forty-first Ohio regiment, and joined Gen. Buell's army. On Jan. 6, 1862, he was appointed to command a brigade, and was conspicuous at the battle of Shiloh. He accompanied Buell in Alabama, and afterwards drove the Confederates from Danville, Ky. At the battle of Stone River he saved the left wing from being turned. He commanded a brigade in the operations before Chickamauga, and afterwards deprived the Confederates of the advantages they had gained by that battle, and relieved the army at Chattanooga. At Missionary Ridge he captured 18 pieces of artillery. During Sherman's march to the sea he commanded a division, with which he captured Fort McAllister, Dec. 13, 1864, for which he was promoted major-general of volunteers. He took part in the operations resulting in Johnston's surrender, and was appointed to the command of the Fifteenth corps, May 19, 1865. In July, 1866, he was made colonel of the Sixth infantry. On Dec. 8, 1880, he was appointed chief signal officer.

HAZLETON, a borough of Pennsylvania, in Luzerne county, is situated in a picturesque mountain region on the Lehigh Valley Railroad, 80 miles N. N. W.

of Philadelphia. The town and vicinity are well known as places of summer resort. Hazleton has a town-hall, an academy, a convent, 10 churches, several banks, daily and weekly newspapers. It has iron-works, lumber-mills, and railway car-shops, but depends mainly for its prosperity upon the neighboring rich and productive mines of anthracite coal. The product is a Lehigh coal of the very best quality. The borough has an important trade, making it the largest town and principal business centre of the Lehigh coal-field. Population in 1870, 4317; in 1880, 7161.

HEADLEY, Joel Tyler, an American author, was born at Walton, Delaware co., N. Y., Dec. 3, 1814. He graduated at Union College in 1839, and studied theology at the Auburn Theological Seminary. He became pastor of a church at Stockbridge, Mass., but was soon obliged to relinquish pastoral work by ill health. He then went to Europe in 1842, and on his return published *Letters from Italy* (1844), followed soon by *The Alps and the Rhine.* He now devoted himself entirely to authorship, and prepared many popular biographies and historical books, among which were *Napoleon and his Marshals* (1846); *Washington and his Generals* (1847); *History of the War of* 1812 (1853); *Chaplains and Clergy of the Revolution* (1861); *Grant and Sherman* (1866); *The Great Rebellion* (1863–66); *The Great Riots of New York* (1873). He has also prepared some volumes of biblical and religious interest, among which are *Sacred Mountains* (1850); *Sacred Scenes and Characters* (1853); *Sacred Heroes and Martyrs* (1870). He resides near Newburg, N. Y., and in 1854 was elected to the State legislature, and in 1855 secretary of the State of New York.

HEADLEY, Phineas Camp, an American author, brother of the preceding, was born at Walton, N. Y., June 24, 1819. He received an academical education and was admitted to the bar in 1847, but afterwards studied theology, graduating at Auburn Theological Seminary in 1851. He has held pastoral charges at Adams, N. Y., and Greenfield, Mass. Among his books are *Women of the Bible* (1850); biographies of *Napoleon* (1855); the *Empress Josephine* (1851); *Mary Queen of Scots* (1853); *Lafayette* (1856); *The Camp and Court of David* (1858); a series of *Heroes of the War* (5 vols., 1863–64); *Massachusetts in the Rebellion* (1866); *Half-hours in Bible Lands* (1867); *Evangelists in the Church* (1873); *Island of Fire*, a description of Iceland (1874); *Public Men of To-day* (1882).

HEALY, George Peter Alexander, an American painter, was born at Boston, July 15, 1813. After studying art for some time there he went to Paris in 1834, and stayed several years. His American home is at Chicago, but he resides chiefly in Europe. He has executed portraits of the most distinguished men of his time. His historical painting, Webster's Reply to Hayne (1851), now in Faneuil Hall, Boston, contains 130 portraits. His works are acknowledged to be earnest and forcible, but are deficient in carefulness and in sense of color.

HEATH, William (1737–1814), an American Revolutionary general, was born at Roxbury, Mass., March 2, 1737. He was brought up a farmer, but in 1770 was commander of the Ancient and Honorable Artillery Company of Boston, was afterwards a member of the committees of correspondence and safety, and in 1774 was a delegate to the provincial Congress. After being appointed brigadier-general and major-general in the provincial army, he was appointed to the same ranks in the Continental army in June, 1775, and August, 1776. He had displayed ability in organizing the army around Boston, and in March, 1776, was ordered to New York, in the vicinity of which he served. In 1779 he had four regiments on the Hudson. At the close of the war he returned to his farm. He was a member of the Massachusetts convention which ratified the Federal Constitution, and was State senator, 1791–92. In 1793 he was appointed judge of probate for Norfolk county, and in 1806 was elected lieutenant-governor, but declined to serve. He died at Roxbury, Mass., Jan. 24, 1814. He published his *Memoirs* in 1798.

HEAVYSEGE, Charles (1816–1876), a Canadian poet, was born of poor parents at Liverpool, England, in 1816. He left school at an early age to become a machinist. In 1843 he married, and in 1853 removed to Montreal, Canada. He had steadily cultivated his talent for poetry, yet not until about 1854 did he venture to print any of his poems, and then only anonymously. Among these were a volume of blank verse, and another containing fifty sonnets. In 1857 his tragedy of *Saul* was published, and its merits were recognized by Emerson, Longfellow, and Hawthorne. In 1860 Heavysege issued a drama called *Count Philippo; or the Unequal Marriage*, and though inferior to his tragedy it brought him employment on the newspapers, which enabled him to give up his trade. He afterwards published an ode for the tercentenary of Shakespeare's birth, and an idyl called *Jephthah's Daughter.*

HEBREWS, Epistle to the. 1. *Authorship.*—This New Testament writing is anonymous. The question of authorship, which has never been settled, differs therefore from that of the genuineness of the epistles in which Paul is named as the writer. While the current of opinion is at present against the Pauline authorship, it is not in accordance with fact to say that "scarcely any sound scholar will be found to accept Paul as the direct author." (See *Literature*, at close of this article.) The diversity of views respecting the author in the early church furnishes one strong argument against the Pauline authorship. But the style of the epistle, together with a few utterances that apparently disclaim apostleship, presents a more serious objection. The difference between this and the Pauline epistles is rhetorical rather than verbal. It strikes every careful student, and cannot be removed by a mere count of identical words and phrases. Yet evidence of this kind is proverbially precarious. Many, therefore, do not deem this argument of sufficient weight to overbear the early, though partially extended, opinion that the epistle was written by the apostle. It is, moreover, difficult to fix upon any other person in apostolic times as the author. Prof. W. R. Smith himself does not decide between Barnabas and Apollos. The latter name now finds favor, less from positive evidence than from the fact that it is more difficult, in the absence of evidence respecting Apollos, to prove that he did not write the letter. "Not proven" is substantially the verdict in every case. The Pauline authorship has undoubtedly found more support, because it seemed easier to maintain the authority of the epistle by recognizing him as the writer. But this proves nothing. In fact, the questions of authorship and canonicity not only may be but ought to be carefully distinguished in a case like this.

See Vol. XI. p. 538 Am. ed. (p. 602 Edin. ed.).

2. *Authority.*—The epistle is cited as authoritative by Clemens Romanus, but with no indication that he regarded Paul as the author. In later times doubts existed as to its canonicity, but only partially even among those who doubted that it was the work of the apostle. In the Reformation period the two questions were kept entirely distinct. The Council of Trent (4th session, April 8, 1546) first made the Pauline authorship an article of faith. Some Protestant symbols class it with Paul's epistles, but the Wesminster Confession expressly leaves the question open. The place of the epistle in the New Testament canon rests, however, on firmer grounds than decrees of councils. The historical evidence, though not so strong as that in support of the Pauline epistles, is overwhelmingly preponderant. The early doubts as to its authority naturally grew out of its anonymous form. These very doubts indicate the care of the early church in its reception of canonical books, so soon as questions arose

in regard to the writings properly constituting the rule of faith. The internal evidence is decisive for all who accept the New Testament writings as authoritative (see under 5). In its opening sentence the book exalts the new and perfect revelation of God in his Son above the varied and incomplete methods of the Old Testament times. By implication it asserts its right to form a part of authoritative exposition of this final revelation; its character, like that of the other New Testament writings, justifies this claim, since with the other books it stands apart from all subsequent literature. The more we know of the Christian writings of the second century the wider and deeper does the gulf appear that separates them from the canonical books. No theory respecting the authorship can alter this internal evidence. It may seem easier to account for the character of the epistle by connecting it with the personal gifts of the apostle to the Gentiles; but if Paul did not write it, then it furnishes us a striking proof that the inspiration of the New Testament is a unique fact, not to be confounded with the gifts and graces of the apostles, and not entirely dependent on their personal authority. Moreover, the doubts in the early church serve to show that the authoritative character of these writings grows out of what they are; it may be recognized by ecclesiastical bodies, but cannot be created by decrees of councils. The uncertainty respecting the authorship of this epistle must continue until the (altogether improbable) discovery of further data. So long as it continues, it forces us to discriminate between the authority of Scripture and the personal authority of the apostles.

3. *Destination.*—The class of readers addressed is obviously indicated in the epistle, but the data it furnishes are insufficient to decide the question of original destination. At present the current of opinion tends towards Rome as the home of the believers to whom the letter was sent. Palestine still has, however, numerous advocates, while but few now favor Alexandria. At Rome the epistle was not at first attributed to Paul; hence, this theory of the destination accords best with the non-Pauline authorship. But while the earliest references to it as an authoritative writing come from that city, the uncertainty which existed there respecting the author seems quite singular, if was written for Roman Christians of Jewish birth.

4. *Date of Writing.*—This should, in all fairness, be placed before the destruction of Jerusalem (A. D. 70). It is true, the writer might have used the present tense after that event, in referring to the temple and its ritual, but only positive reasons to the contrary can destroy the force of the implication that the temple was still standing when he thus wrote. Nor is it likely that such a writer would have ignored an event so important in its bearing upon his theme, had it occurred but a few years before. Nothing is gained by assigning a later date. The attempt to place the epistle near the close of the first century is part of a theory which seeks to weaken the authority of the New Testament writings. It seems probable that it was written after the beginning of the persecution under Nero (A. D. 64), and before the beginning of the Jewish war (A. D. 67). Davidson and Schaff, however, assign it to A. D. 63, and Conybeare and Howson to A. D. 68 or 69.

5. *Theme, Contents, and Character of the Epistle.*—The discussions about the uncertain questions, above referred to, not infrequently throw into the background the magnificent thought of the epistle. The argument is, however, intelligible on any theory that recognizes the recipients of the letter as believers of Jewish birth and education, who were tempted by threatening dangers to draw back from Christianity. To warn and encourage them the writer sets forth the superiority of the Christian revelation, because of the superiority of Christ himself, the real High-priest prefigured in the antecedent revelations of God during the Old Testament economy. He is superior to angels, to Moses, to the Levitical priests; that, too, in his person, in the sanctuary and covenant in which he officiates, and, pre-eminently, in the availing sacrifice he offered. Hortatory passages occur throughout this didactic statement, but they are always interwoven with admirable rhetorical fitness. The latter part is an application, enforcing steadfastness, not only by the main thought, but by the example of the Old Testament heroes of faith, and by the assurance of God's fatherly discipline in their trials.

While the epistle shows great skill in the articulation of its minor details, the progress of thought is less logical, and the arrangement of words and clauses far more rhetorical than is usual in the writings of Paul. The theme calls for the parallels and contrasts of type and anti-type; a task for an imagination of the highest order. The whole letter is poetic in the noblest sense. One peculiarity of the author resembles Wagner's *Leit-motif* in musical composition: a new thought is suggested, to be skilfully elaborated afterwards. The hortatory portions of the epistle are characterized by an arrangement akin to musical modulation: first exhortation, then warning accented almost into censure, then words of encouragement, leading back to the main thought; all skilfully handled so as to perpetuate the movement of the whole. Even in the closing chapter, with its personal notices, the same imaginative power is shown, and few sentences in the New Testament are more touching than the doxology of verses 20, 21.

Another point should not be overlooked: In this epistle we find set forth the unity of Divine revelation in its progressive method. Elsewhere, especially in the letters to the Galatians and Romans, the mutual relations of law and gospel are emphasized, but here the two revelations are shown, with much detail, to be parts of one great redemptive process. It is not so much the universality of the gospel as its completeness. Paul shows that this is the message for all; this epistle shows that it is the message once for all, there being no progress beyond this. The theological point of view is undoubtedly Pauline; but from the nature of the theme the discussion is fuller, and the flight of inspired imagination loftier. Stress is laid upon the sacrificial purpose of the death of Christ; but the resurrection obtains due validity, since only the risen High-priest could enter the true Holy of Holies. As the key to the entire historical movement culminating in the facts of salvation—the death, resurrection, and ascension of Christ—this book agrees with all the others, explains all the others. He who believes that God has spoken in the prophets and in the person of his Son will hear his voice throughout this epistle; it will be easy to reckon so masterly a statement of the entire sweep of his revelation among the records of that revelation. Since the Lord promised the Holy Spirit to glorify himself by declaring the truth respecting himself (John xvi. 14), here is a book that stands this test of inspiration, whether it be of Paul, or of Apollos, addressed to Jerusalem or to Rome. Not less does it prove its origin by bringing home its grandest thoughts to the cares, trials, temptations, and needs of the humblest believer. To its authority it is itself the best witness.

Literature.—The most important American commentary is that of Moses Stuart (Andover, 1827, revised by Robbins, 4th ed., 1860), defending the Pauline authorship; so Kay (*Speaker's Commentary*, London and New York, 1880); Angus (Schaff's *Popular Commentary*, New York, 1882). In *Lange's Commentary* (Amer. ed., New York, 1868) Kendrich has made valuable additions to Moll (accepting Apollos as the probable author); S. T. Lowrie (New York, 1884), bases his exposition largely upon that of Von Hofmann, which is thus made accessible to the English reader; Timothy Dwight (New York, 1885) has enriched the English translation of Lünemann (in the Meyer series of commentaries). See also the very full and valuable additions of Ezra Abbot to Davidson's article, "Hebrews," in *Smith's Bible Dictionary* (Amer. ed.), and the revised article of Zahn in the Schaff-Herzog *Encyclopædia* (New York, 1883). (M. B. R.)

HECKER, Friedrich Karl Franz (1811–1881), a German-American revolutionist and soldier, was born at Eichtersheim, Baden, Sept. 28, 1811. He was educated at Mannheim, and in 1838 became an advocate in the Superior Court at Mannheim. In 1842 he was elected to the chamber of deputies of Baden, and soon became a prominent member of the opposition. While visiting Prussia in 1845 he was arrested at Berlin and ordered out of the country. In the diet in 1846–47 his extreme views put him in opposition even to the liberals, and for a time he withdrew from its meetings, but he returned and became leader of the extreme left. In the assembly at Heidelberg, in March, 1848, he appeared as a socialist and republican, and he sought with the aid of Struve to unite the South-Germans in a revolutionary movement, which proved a failure. Hecker was obliged to flee to Switzerland. In September, 1848, he emigrated to America, but was recalled by the provisional government erected in Baden in 1849. Before he arrived the government had collapsed and he returned to America, settling as a farmer at Belleville, Ill. In 1856 he was a prominent speaker in behalf of the Republican party. In 1860 he raised the first German Illinois regiment, and while serving under Gen. Fremont was wounded. Afterwards he had command of a brigade under Gen. Howard, and was wounded at the battle of Chancellorsville. In March, 1864, he resigned, and retired to his farm. In the winters he delivered popular lectures to German-Americans, and a selection from these lectures was published in Germany in 1873. He died at St. Louis, March 24, 1881.

HECKER, Isaac Thomas, an American clergyman, the founder of the Paulists, was born in New York, Dec. 18, 1819. In 1843 he joined the celebrated Brook Farm Association, near Boston, and afterwards was for a time connected with a similar community at Fruitlands, in Worcester co., Mass. In 1845 he became a Roman Catholic, and in 1847 he joined the Redemptorist fathers in Belgium. In 1849 he was ordained priest by Cardinal Wiseman, in London, and returned to New York in 1851. In 1857, being at Rome, he was, with some of his associates, released by papal authority from connection with the Redemptorists, and in 1858 he founded the new congregation of the missionary priests of St. Paul, having their principal house in New York. He established *The Catholic World*, a monthly periodical, in 1865, and took part in the Vatican Council of 1869 as procurator for Bishop Rosecrans. Among his works are *Questions of the Soul* (1855); *Aspirations of Nature* (1857); and a pamphlet on *Martin Luther* (1883).

HECKEWELDER, John Gottlieb Ernest (1743–1823), an American Moravian missionary to the Indians, was born at Bedford, England, March 12, 1743. His father brought him to America at the age of eleven. In 1762 he accompanied Mr. Post on an expedition to the Indian tribes on the Ohio, and in 1771 he became a missionary to the Delaware Indians. In 1797 he was sent to superintend the Christian Indians on the Muskingum. In 1811 he retired to Bethlehem, Pa., where he afterwards prepared a *History of the Indians of Pennsylvania* (1819), and a *History of the Moravian Missions* among them (1820). He died at Bethlehem, Pa., Jan. 21, 1823.

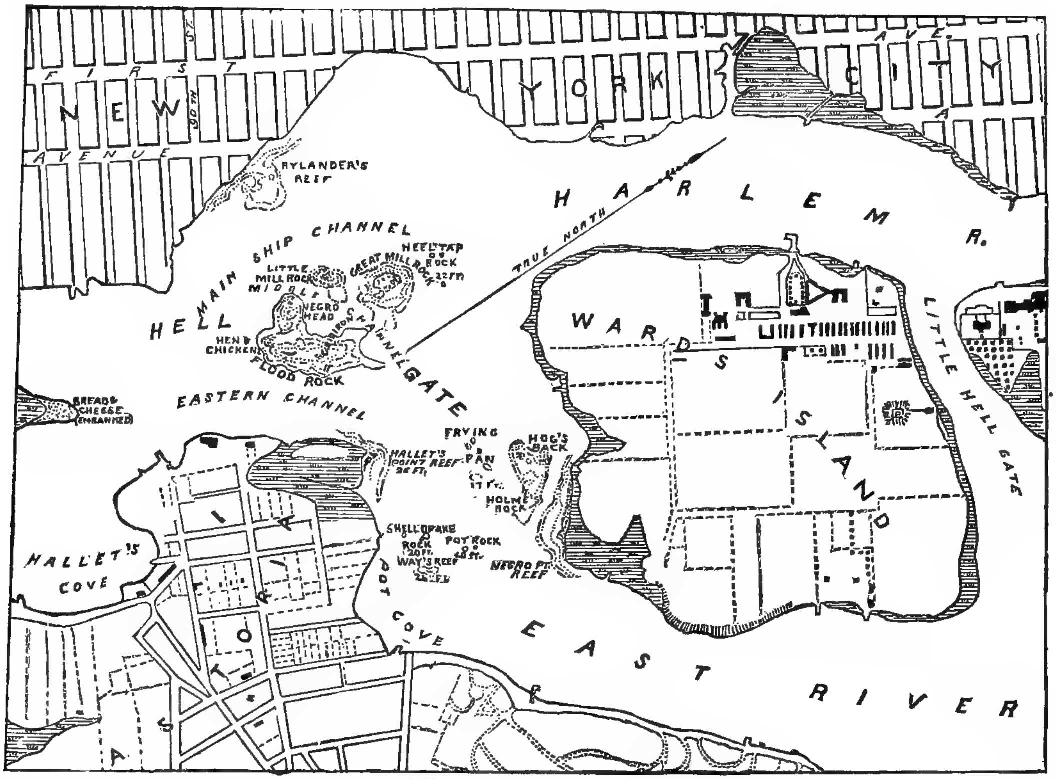
HEDDING, Elijah (1780–1852), an American bishop, was born at Pine Plains, N. Y., June 7, 1780. He was licensed in 1800, and he preached in Northern New York, Vermont, and New Hampshire, enduring great hardships. In 1807 he was presiding elder of New Hampshire, and in 1808 was a delegate to the General Conference at Baltimore. Afterwards he labored in Massachusetts and assisted in founding *Zion's Herald*, the first journal of the Methodist Episcopal Church in the United States. In 1824 he was chosen bishop and was zealous in the discharge of his duty until 1844, when infirmities began to press upon him. Yet in 1848 he was a delegate to the British Wesleyan Conference. He died at Poughkeepsie, N. Y., April 9, 1852. His *Life* was written by D. W. Clark (1855).

HEDGE, Frederic Henry, an American clergyman and author, was born at Cambridge, Mass., Dec. 12, 1805. His father, Levi Hedge (1767–1843), was from 1810 to 1827 professor of logic and metaphysics in Harvard College. Frederic was educated in Germany, returned to America in 1823, and graduated at Harvard in 1825. Having studied theology he became pastor of a church at Cambridge in 1829, removed to Bangor, Me., in 1835, to Providence, R. I., in 1850, and to Brookline, Mass., in 1856. In 1858 he became professor of ecclesiastical history in the Theological Department of Harvard College, and was editor of the *Christian Examiner* from 1857 to 1860. He resigned his pastorate in 1872 to accept the professorship of the German language in Harvard College. Besides many poems, original and translated, and contributions to the *North American Review* and other periodicals, Dr. Hedge has published *The Prose Writers of Germany* (1848); *Reason in Religion* (1865); and *The Primeval World of Hebrew Tradition* (1870). In theology he is a Christian rationalist; as a writer he is noted for the purity of his style and the vigor of his intellect.

HEFELE, Karl Joseph von, a German bishop, was born at Unterkochen, in Würtemberg, March 15, 1809. He graduated at Tübingen in 1834, and in 1840 he was chosen professor of church history, Christian archæology and patrology in the Roman Catholic faculty there. In 1869 he was consecrated bishop of Rottenburg. In the Vatican Council he voted against the declaration of papal infallibility, as being inopportune, but accepted that dogma when definitely announced as of the faith. Among his works are *Die Einführung des Christenthums im südwestlichen Deutschland* (1837); *Patrum Apostolicorum Opera* (1839); *Das Sendschreiben des Apostels Barnabas* (1840); *Der Cardinal Ximenes und die Kirchlichen Zustände Spaniens im* 15. *Jahrhundert* (1844); *Chrysostomus-Postille* (1845–57). His *Consiliengeschichte* (7 vols., 1855–74) is a work of the first importance. He also published *Beiträge zur Kirchengeschichte Archäologie und Liturgik* (1864–65); and *Causa Honorii Papae* (1870). After the establishment of the new German empire he vigorously maintained the cause of the Roman Church against the repressive legislation of the time.

HEILPRIN, Michael, a Polish-American author, was born at Piotrków, Russian Poland, in March, 1823. His father, Phineas Mendel Heilprin (1801–1863), was a noted Hebrew scholar, who with his family was driven by Russian oppression from his native Poland to Hungary in 1842. In this country the family joined in the Revolutionary movement of 1848. Michael was employed in the literary bureau of the department of the interior under the presidency of Kossuth. In 1856 he removed to America, where he has been engaged in literary work. Besides contributing to periodicals he has been associate editor of Appleton's *American Cyclopædia*, and similar works. He has also prepared *The Historical Poetry of the Ancient Hebrews* (2 vols., 1879–80).

HELL GATE IMPROVEMENTS. The extensive obstructions at Hell Gate in East River, New York Harbor, U. S. A., have been the cause of numerous marine disasters. They consist of dangerous rocks and reefs, both in mid-channel and projecting from the shores of islands washed by a rapid current, which changes with the flood and ebb of the tide, and are designated as the Gridiron, Flood Rock, Hen and Chickens, Negro Head, Bread and Cheese, Hallett's Point, Way's Reef, Pot Rock, Frying Pan, Middle Reef, etc. (See map.) It was estimated that during the two months consumed by the survey of these channels fifty vessels went ashore on the rocks. But it was not until Aug. 18, 1851, that an attempt was made to remove them by introducing M. Maille-



Map of Hell Gate and its Surroundings.

fert's process of surface-blasting. This consisted of placing large charges of gunpowder, usually 125 lbs., on the surface of the rock and exploding it by a voltaic current. The broken material was not dredged, as it was assumed the currents would carry it away. The rocks operated upon were Pot Rock, which was reduced from 8 feet depth of water to 18$\frac{3}{10}$ at a cost of $6837.50, and a consumption of over 34,000 lbs. of powder; the Frying Pan, which was 16 feet long and only 6 inches wide on top, with a depth of 9 feet at low water, and was lowered to 16 feet, at a cost of over $2000 and 12,387 lbs. of powder; Way's Reef, which was conical, with a depth of 5 feet, and was lowered to 14 feet at the same proportional expense; Bald-Headed Billy, a boulder 6 by 6 feet, which was blown into deep water by a single blast, at a cost of $500 and 125 lbs. of powder; Sheldrake Rock, where the depth was increased from 8 to 16 feet; and Diamond Reef, where the depth was increased from 16 to 18 feet. The total cost of these improvements was $13,861, and the total number of pounds of powder used was 74,192, fired in 620 cartridges; all conducted under appropriations made by the citizens of New York. As the depths obtained were insufficient for first-class vessels and numerous other obstructions remained, the U. S. government began making appropriations in 1852, when $20,000 were appropriated, under which Major Frazer, U. S. E., by continuing the Maillefert process, increased the depth over Pot Rock from 18$\frac{3}{10}$ to 20$\frac{3}{10}$ feet, at a cost of $18,000. From this it was inferred that whenever the rock was columnal or conical in form the Maillefert process was very effective and generally cheaper than any other, but when in large masses with flattened surfaces it was very slow and expensive.

For the further improvement of this dangerous passage it was deemed expedient to adopt other methods, and that of drilling under water through diving-bells, the only other method then in use, was not applicable because of the velocity of current, contracted space, and danger from collisions.

No satisfactory plant was devised until 1866, when Gen. John Newton, U. S. E., proposed drilling from a fixed platform through tubes reaching to the surface of the rock. This plan necessitated divers, who were to be protected from the current by movable dams or curtains of iron. This plan was modified until the plant, as used in 1869, consisted of a floating scow having an opening of 32 feet diameter in its centre, through which a large hemispherical iron bell, open both at top and bottom, was lowered to the rock below. This dome or caisson, 30 feet in diameter, made of boiler-iron, affords a frame-work for supporting 21 drill tubes. The drills working through them have a stroke of 18 inches, and weigh from 600 to 900 lbs. The dome has legs which are let out or drawn in to fit the rock and are held in place by cams. This lower open space was intended to be covered by a chain or canvas curtain to break the force of the current, but it was not found to be necessary. The drilling being completed, the holes are filled by a diver who inserts the charges of nitro-glycerine and makes the connections, when the plant is floated off and the blast fired. The broken rock is removed by a Morris & Cummings steam-grapple. It was not until May, 1871, that the steam-drilling scow was first practically introduced on the Diamond Reef, where it was found necessary first to remove by dredging the overlying deposits of sand, gravel, silt, ballast, and boulders, by which it was covered, before the drills could be used. The holes were from 7 to 13 feet deep, 4½ inches in diameter at the top, tapering to 3½ at the bottom, and were fired by charges of from 30 to 55 lbs. of nitro-glycerine. The scow ceased work on this reef in January, 1880.

Coenties Reef was operated upon in like manner between 1871 and 1875. During these operations, though the scow encountered numerous collisions, it suffered no other damage than a rupture of the anchor chains. It was also used at the Frying Pan, July 22, 1872, where it drilled 17 holes and made 11 surface blasts; and at Pot Rock, between Aug. 5 and Dec. 28, 1872, when it was struck by vessels 16 times. Four of the colliding vessels were sunk; one was drawn under the scow and carried off the dome, which was recovered in 80 feet of water considerably damaged. Way's Reef was reduced from 17½ feet to a depth of 26 feet at mean low water by the operations of the scow between Aug. 4, 1874, and Jan. 20 following. The size of the rock at the 26-foot curve is 235 feet long by a maximum width of 115 feet.

But the most extensive of all these operations was the removal of the reef at Hallett's Point. This was accomplished by sinking a large shaft on shore, from which 41 radial and 11 concentric galleries, 25 feet apart and of variable cross-sections, were driven under the reef. The aggregate length of the galleries opened was 7,425.67 feet, and the volume of rock in dump piles on the land was 49,480 cubic yards. This plan was first proposed by Mr. G. C. Reitheimer in the spring of 1868. A similar plan was proposed by Gen. Alexander, of the U. S. corps of engineers, and A. W. Von Schmidt, civil-engineer, Oct. 3, 1868, for the removal of Blossom Rock in the harbor of San Francisco, Cal., where it was successfully applied, April 23, 1870. Work on the shaft at Hallett's Point, 32 feet deep, was commenced in October, 1869, and during its continuance careful records of the progress and cost by various drills gave for the Burleigh drill between 36 and 37 cents per foot of hole, including repairs and all items of expense except first cost and interest. The cost of hammer-drilling was found to be about 95 cents per foot. With 9 Burleigh drills 7 can be kept at work. The number of feet of holes drilled by each machine per shift of 8 hours was 30 feet. The Diamond drill, owing to frequent veins of quartz, did not answer well, but should prove valuable for softer rocks. The Ingersoll rock-drill proved itself fully equal to the others. Owing to the restricted area of the galleries the following data are confined to the experience in the most difficult part of tunneling known as "headings." To blast *one cubic yard* required 10 lineal feet of holes drilled at 37 cents per foot, 1.22 lbs. of nitro-glycerine, 0.39 lbs. of gunpowder; and the following percentages of cost for the various operations were found to exist when the cost of blasting and removing one cubic yard was made the unit of comparison:

Blasting	46. %
Conveying rock to shaft.	17.
Hoisting	13.28
Dumping	2.03
Pumping	10.37
Incidentals	21.32
Total	100.00

The estimated amount of rock above the 26-foot curve was 53,971 cubic yards, covering about three acres. The amount to be removed by the explosion was 63,135 cubic yards, which became 86,992 yards after the explosion. The excavations were completed in June, 1875. The actual time, therefore (deducting stoppages), was four years and four months. This was followed by the drilling of holes in piers and roof for the charges, which was completed March 25, 1876, when there had been drilled 5375 3-inch holes in the roof, and 1080 3-inch and 286 2-inch holes in the piers; total length of 3-inch holes 56,548 feet, and of 2-inch 1897 feet. The number of holes charged was 4427; the number of cartridges used, 13,596, many holes containing two of 11 inches each. The charging was commenced Sept. 11, 1876, and completed on the 20th of the same month. The batteries for firing consisted of 40, 43, 44 cells of zinc and carbon, or 960 cells in all, divided into 23 distinct batteries, each one arranged to fire 160 fuses in divided circuits of eight groups of 20 each. Thus there were 3680 mines connected in continuous series with a lead and return wire to close the circuit with the circuit-closer.

Everything being in readiness the mines were tamped by water run in through a syphon, which was started at 12.07 A. M. Sept. 23, 1876, and at 7.30 P. M. of same date the excavations were filled to the level of the tide. The next day, Sunday, 24, the mines were fired at 2.50 P. M., without hurtful shocks to any surrounding objects. The elevation of water and spray reached a height of 123 feet.

Flood Rock.—This dangerous reef, which projects above water, is situated in mid-channel, and at a distance of about 660 feet west of the Astoria shore. Its removal has been accomplished in accordance with the plans of Gen. John Newton, U. S. corps of engineers, and under his immediate supervision, assisted by Lieut.-Col. W. McFarland, Major Wm. Heuer, Capt. Jas. Mercur, Lieut. G. McC. Derby, and others. Work was begun June 7, 1875, by sinking a shaft 10 by 20, and forming an artificial island of the débris to furnish room for the plant.

Suspensions occurred from May 26 to Sept. 30, 1876, and on Dec. 31 of same year the heavy ice in the channel caused work to cease and the mine was filled with water. During the fiscal year ending June 30, 1878, there were no funds available, and during the next year progress was impeded by lack of sufficient machinery, and by the water which had flooded the mine for eighteen months, in consequence of which frequent timbering was required. Another interruption occurred between July 20 and Aug. 21, 1882, and again from March 31 until May 31, 1883, from want of funds, and the next year, 1883–84, no appropriation bill was passed by Congress.

These suspensions added to the cost of the work, in consequence of the pumping, as the mines contained several large seams which at first admitted 737 gallons per minute, but by careful plugging this amount was reduced to 565 gallons per minute on July 22, 1884.

The plant, comprising compressors, pumps, boilers, fans, drills, condensers, hoisting machinery, tugs, and other accessories, was estimated to be worth $125,000. The undermined area covered about 9 acres. The galleries were about 10 feet square, and their total length was 21,670 feet. The shell averaged 18.8 feet thick, and was supported by 467 piers about 15 feet square and 25 feet apart from centre to centre. Twenty-four galleries extended parallel to the axis of the river "and strike of the rock," and 46 at right-angles thereto. To break up the roof and columns 12,561 3-inch holes were drilled, having an average length of 9 feet. In the columns they were placed 5 feet apart, and inclined upward at an angle of 45°. In the roof they were 4 feet apart, and at angles of from 60° to 65°. Their total length was 113,102 feet, or more than 20 miles. Rand & Ingersoll percussion-drills were used, operated by compressed air. The total quantity of rock taken out was 80,166 cubic yards, while the estimated quantity to be ruptured by the blast was 270,717 cubic yards.

The following table shows the number of lineal feet of drilling required to remove one cubic yard of rock in the galleries and the price:

Year.	Feet of hole.	Cost per cub. yard for drilling.
1876.	9.0	$0.42 per lin. foot.
1877	7.5	2.08
1878		
1879	10.86	2.16
1880	14.66	
1881	14.88	
1882	14.90	0.68 per lin. foot.
1883	19.48	6.652

In headings 10 by 6 it required 3.62 lbs. of explosive per cubic yard, and for stoping but 1.39 lbs. The total cost of removing one cubic yard of a heading 6 by 4 feet was about $10, and stoping $4.

In charging the holes cartridges 24 inches long and 2¼ inches in diameter were inserted, and held in place by 4 small wire legs. The first one introduced contained 6 lbs. of "rackarock," formed by mixing 79 per cent. of finely ground chlorate of potash with 21 per cent. of dinitro-benzole. Similar cartridges were added until the hole was nearly full, when finally a dynamite cartridge 15 by 2¼ inches, containing 3 lbs. of dynamite, with a 30-grain fulminate of mercury exploder inserted and allowed to project about 6 inches, so that it might receive the full effect of the initial charges connected with the battery. The mine was "fired" by primary charges placed at intervals of 25 feet along the galleries. They consisted of two 24-inch dynamite cartridges of 5 lbs. each, lashed to timbers placed across the gangway. The concussion produced by their explosion ignited the primers in the remaining charges of rackarock, and so exploded the entire mine simultaneously by what is known as the sympathetic method, thus saving a large amount of wiring. The total amount of rackarock used was 240,399 lbs., and of dynamite 42,331 lbs.

The entire mine was divided into 24 independent circuits. So far as possible adjacent charges were put on different circuits to avoid risk of failure. The whole number of primary charges was 591. The battery contained 60 cells coupled in one series. There were 4 carbon and 3 zinc plates, each 6 by 9 inches, in each cell, which were separated by ¼ of an inch. The ordinary bichromate solution was used.

The mine was flooded by 2 syphons of 12 and 16 inches diameter in 15½ hours, ending at 3.30 A. M., Oct. 10, but the final arrangements for firing could not be completed before 11.13 A. M., same date. As the electric contact was made, an immense mass of water about 1400 feet long by 800 wide rose to some 200 feet, the earth shook, a dull thud was heard, and the whole reef was shattered, but the resulting wave was insignificant. There was no severe shock, and the only damage done was the breaking of a few panes of glass, and shaking down of loose bricks and plaster in Astoria. The resistance to the force of the explosion amounted to about 500,000 tons of rock in place, covered by 200,000 tons of water, which was sufficient to confine the effect to narrow limits. About 1,240,000 cubic feet of gas are estimated to have been liberated.

The velocity of propagation of the shock through earth was found to be 5120 feet per second.

Dredging was immediately commenced by the government scow, which removed from 15 to 30 tons of stone each day. A contract was let in the latter part of October, 1885, for the removal of 30,000 tons of rock at $3.19 per ton, including surface blasting. The removed rock was to be dumped between Hog's Back and Ward's Island. About 120 tons are removed daily. The total cost of work at Flood Rock, including the final blast, amounted to $2.99 per cubic yard of the whole amount of rock broken. This was 34½ per cent. less than the cost at Hallett's Point, but there still remains a large amount of work to be done in removing the broken rock above the 26-foot curve. The total cost of the final blast at Hallett's Point was $81,092.24; at Flood Rock it was $106,509.93, although the blast was 5.6 times as large. It will require as much dynamite to reduce the rock to sizes capable of being handled by the grapples as was required in the original blast. The greatest weight that can be lifted is 15 tons, or a cube of 6 feet on edge, 8 cubic yards.

The improvements originally intended for Hell Gate have since been modified to include the rocky obstructions known as Diamond Reef, Coenties Reef, a reef near the North Brothers' Island, and the Pilgrim Rock. These have been removed to a depth of 26 feet at mean low-water, and with the work already done at Hallett's Point, Flood Rock, Way's Reef, and Shelldrake, and the partial removal of the Heel Tap, Frying Pan, and Pot Rock, constitute about four-fifths of the entire project.

The completion of work at Flood Rock will nearly double the width of the principal channel.

The total amount of money expended on these improvements in Hell Gate to the close of the fiscal year, June 30, 1885, has been $3,261,276.06, and the "amount estimated to be required for the entire and permanent completion of the work of improvement, in accordance with the approved and adopted project, is $1,601,340.67," making a total expenditure of $4,862,616.73 for 26 feet of water at mean low-tide through this once very dangerous passage.

Authorities.—Reports, Chief of Engineers, U. S. A.; *Popular Science Monthly, Scientific American, Engineering News,* and local papers. (L. M .H.)

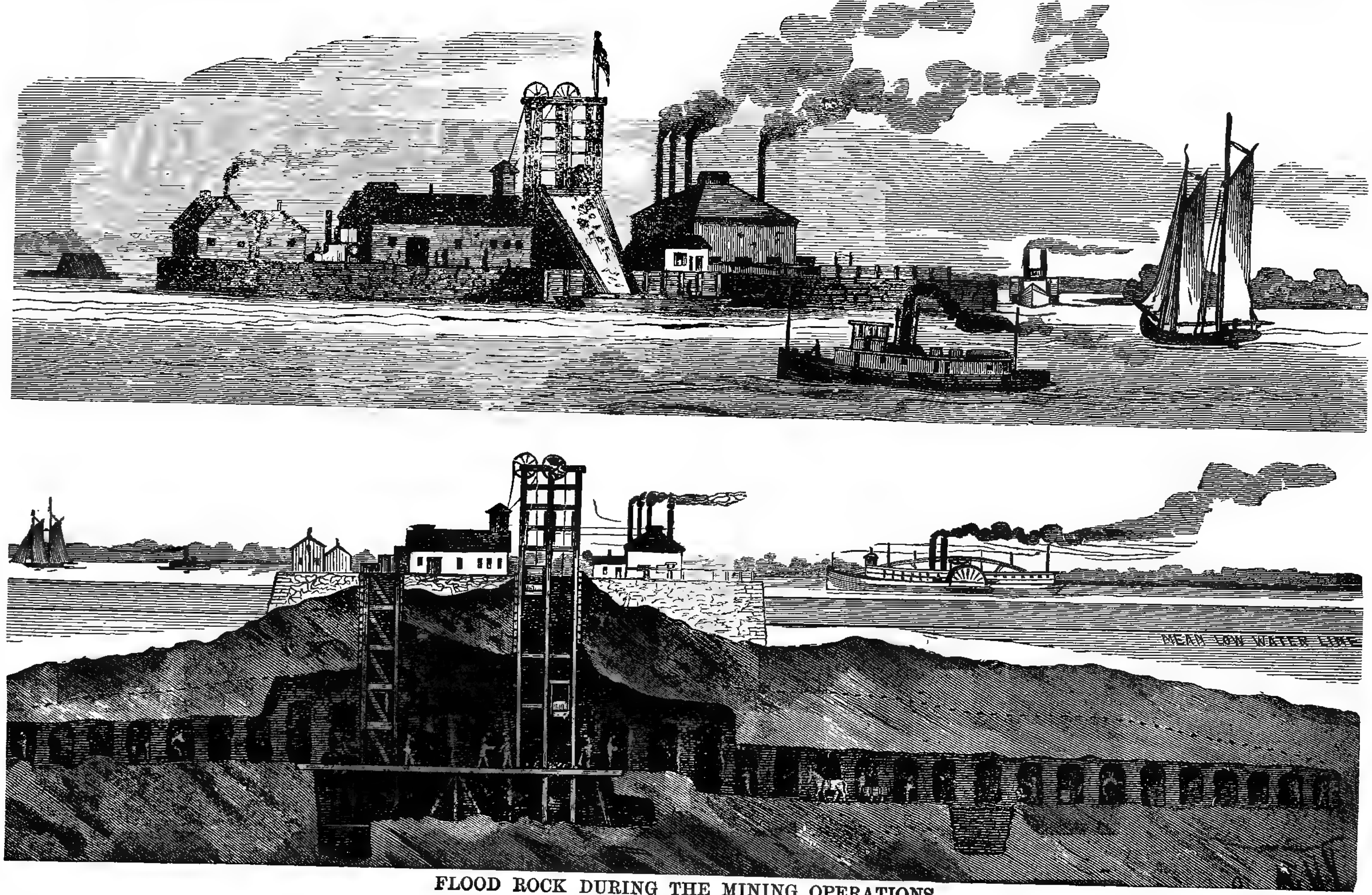
HELMHOLTZ, HERMAN LUDWIG FERDINAND, a German physicist and physiologist, was born Aug. 31, 1821, at Potsdam, where his father was an instructor in the gymnasium. The son studied medicine at Berlin from 1838 to 1842, and for a year after was assistant physician at the Charité hospital. Then he served as a military surgeon, and in 1848 became a lecturer on anatomy at the Berlin Art Academy. In July, 1849, he was called to be professor of physiology in the University of Königsberg, and his researches while holding this position greatly extended his fame. In 1855 he was made professor of anatomy and physiology at Bonn, and in 1858 he removed to Heidelberg, where he held the professorship of physiology. Since 1871 he has been professor of physics in the University of Berlin. In 1870 the French Academy admitted him to foreign membership.

Helmholtz is noted for his investigations of optics, acoustics, and electricity, which have established these sciences on a new basis. In his graduating thesis on the "Nervous System of the Evertebrates" he had shown his ability to make most delicate researches, and other treatises on animal physiology confirmed his growing reputation. His first finished work, *Uber die Erhaltung der Kraft* (1847), caused him to be recognized as one of the foremost champions of the new philosophy of force. This essay was afterwards expanded into *Uber die Wechselwirkung der Naturkraft* (1854), and in the mean time his lectures on the same subject being translated into several languages attracted attention throughout the world. His invention of the ophthalmoscope in 1851 revolutionized both the medical treatment and the physical knowledge of the eye. His *Handbuch der physiologischen Optik* (1856–66) laid a new foundation for the science of vision, as did also his work, *Die Lehre von den Tonempfindungen* (1862: 4th ed., 1877), for the science of music. Throughout these works ingenious experiments are combined with mathematical reasoning and philosophic thought. He has solved many practical questions which have puzzled musicians, as well as suggested reasonable explanations of many perplexing facts in æsthetics and physiology. Besides the main works already mentioned, Helmholtz has published numerous articles of the greatest value in the scientific journals. He has also delivered every year popular lectures, in which he has set forth with admirable clearness and tact the results of many of his most abstruse investigations. Some of these lectures have been published in book-form, and Prof. E. Atkinson has translated two series of them into English.

Of the very numerous and far-reaching discoveries of Prof. Helmholtz in the several distinct branches of science to which he has devoted his attention, only the most striking, and those to which he owes his wide-spread reputation, are here mentioned. In optics, the invention of the ophthalmoscope, the result of a long-continued investigation into the character and conditions of the human eye, has given to the medical profession an instrument which has saved thousands from blindness. Acoustics first became a definite science in his hands. He invented a method of analyzing sound by the use of instruments called resonators, consisting of hollow bodies, whose volume of contained air vibrated in the presence of previously determined sounds. By the aid of this instrument he

HELL GATE IMPROVEMENTS.

PLATE XXXI.



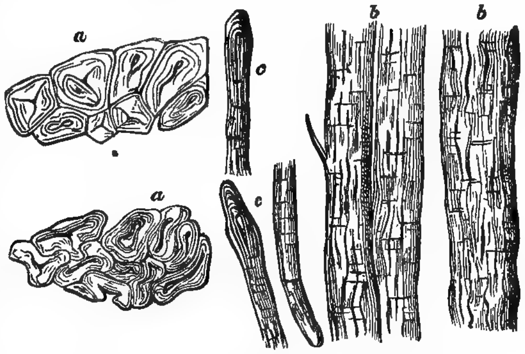
FLOOD ROCK DURING THE MINING OPERATIONS.
(Perspective and Sectional Views.)

discovered the cause of musical harmony, and proved that the peculiar tone of every instrument is due to the addition of various overtones and resultant or combination tones to the fundamental, these differing in intensity and pitch with every instrument; that two musical sounds are in harmony when they have one or more common simple sounds; and that the same is the case with two chords when they have one or more compound sounds in common. His researches on *beats* as the cause of dissonance were of equal value. His most striking addition to physiological science was his research into the rapidity of nerve conduction, in which he proved clearly that sensations move with comparative slowness from the surface to the brain, and that an act of will is similarly retarded in producing its effect upon the muscle. This quite disproved the old theory that the agency of nerve action was electricity, since the rate of nerve conduction is excessively slower than that of an electric conductor. In physical science his researches into vortex motion are of extreme interest, and proved that a vortex ring in smoke or vapor has extraordinary qualities previously unsuspected. These discoveries have given rise to the new atomic theory of Sir William Thompson, who advances the idea that atoms are really vortex rings in a non-frictional ether, and as such must be absolutely permanent in shape, substance, and duration. (C. M.)

HEMLOCK, or **Hemlock Spruce**, a large and valuable North American conifer, which grows abundantly in the Northern United States and Canada, and whose wood is very largely used for building purposes, railroad ties, etc. The commercial species, *Tsuga* (*Abies*) *Canadensis*, grows to a height of from 60 to 100 feet, and from 3 to 4½ feet in diameter of trunk. It frequents dry, rocky ridges, and often forms extensive forests, almost to the exclusion of other species. Less commonly it is found along the borders of swamps, in deep, rich soil. In the United States it extends through several of the Northern States, reaching as far west as Central Wisconsin, and south to Northern Delaware, while it follows the Alleghanies as far as Upper Alabama. It grows abundantly throughout Canada, often in vast tracts, and extends to the northern limit of arborescent vegetation. The hemlock differs from the ordinary spruce in having flat, two-ranked leaves, and in the mode of opening of the anther-cells; and from the firs, in having persistent cones, and in some minor characters. It is a handsome, ornamental tree when young, with long, gracefully drooping branches. It is also grown for ornamental hedges. The cones are small, ovate, and terminal, with few scales, their length being about ¾-inch, while the leaves are still shorter. In addition to *T. Canadensis* there are several other species. *T. Caroliniana* is a small tree of the Southern Alleghanies, rare and local. It is closely allied to the above. *T. Merteusiana* is found from Alaska as far south as California. It is a large tree, 100 to 200 feet high, and 4 to 10 feet thick, often forming extensive forests along the base of the Cascade range. Its bark is the principal tanning material of the north-west coast. *T. Pattoniana* is a smaller tree, of Alpine habits, growing on dry slopes and ridges, from an elevation of 2700 feet in British Columbia to 10,000 in Central California, which is nearly the highest limit of tree growth. A variety of the great red fir of the West, *Pseudotsuga Douglassii*, is also known in California as hemlock. The wood of the commercial hemlock is light, soft, brittle, coarse, and crooked-grained, not durable, and is difficult to work. Its color is light-brown, tinged with red, or often nearly white. It is stronger than white pine, and is largely used in construction for outside work. The bark is rich in tannin, and is the principal material used in the Northern States in the tanning of leather. It also yields a fluid extract, sometimes employed in medicine as a powerful astringent. Canada, or hemlock pitch, used for stimulating plasters, is made from this species.

See Vol. XI. p. 577 Am. ed. (p. 647 Edin. ed.).

HEMP, *Cannabis sativa*, a member of the *Cannabinaceæ*, a small order containing only two genera, each with a single species, the hemp and the hop plants. The name hemp is given not only to the plant but also to its commercial product, the fibre of the inner bark, which is used to make cordage. There are several other fibre-yielding plants whose product is also known as hemp, but these are of late utilization, while the hemp plant has been cultivated for this purpose since very early times. It is a native of Asia, where it seems to be indigenous over a wide district of the southern region. It is an annual, with a rough, angular stem, from 4 to 12 feet high. The leaves are mostly opposite, digitately divided, with 5 or more serrated leaflets. The flowers are diœcious, without petals, of greenish hue, the staminate flowers in drooping panicles, with 5 sepals and stamens, the pistillate in clustered erect spikes, the ovary with two styles in a calyx of one sepal. The nut is ovoid, greenish, reticulated with whitish veins. Flowers, June; fruits, August. In addition to its valuable fibre it yields two other commercial products. One of these is the seed, which is used as food for cage-birds, and yields a large percentage of oil when pressed. This oil, of which Russia furnishes the principal supply, is used in the manufacture of soaps and varnishes, and also for burning. Its other product is a resinous exudation, which has strong narcotic properties. It is yielded most fully in hot climates. The leaves, twigs, and flowering heads of the plant produce a similar effect. This narcotic is known as *hasheesh* and by several other names, and is much used in India and some other countries.



Fibres of Hemp (*Cannabis sativa*) magnified 275 times.

a. Sections of groups of fibres. *b.* Fibres seen longitudinally.
c. Ends of fibres.

Attempts to cultivate hemp in America were made early in the history of the Plymouth and Virginia colonies. In Pennsylvania the colonial government offered bounties for its culture in 1730. These attempts were unsuccessful, though of late years it has become a valuable agricultural product of the United States, particularly in Kentucky. It is cultivated to some extent in all the Northern States, but of the 5025 tons of fibre produced in 1879, 4583 tons were from Kentucky, and 209 from Wisconsin. It is cultivated in Northern New York, mainly for the seed, the yield being from 20 to more than 40 bushels per acre. The export of hemp and its product, in 1880, was valued at $1,272,451.

For the successful cultivation of hemp there is needed a rich alluvial loam, well dried, but not absolutely dry. It yields a full and quick return within the season, being sown as soon as safe from frost, and harvested when the leaves are ready to fall. The staminate plants yield the best fibre immediately after flowering, the seeding plants at a later stage of growth. The plant is now almost always cut, in preference to pulling, as involving less labor and yielding better results. It is then rotted by exposure to the dew, or by steeping in vats for several days, and is afterwards broken in a machine like the flax-breaker. Some further processes are necessary to fully separate the fibre, which is then twisted into bundles for the market. When cultivated for seed-bearing, hemp greatly exhausts the land. Cultivated for the fibre, it is but moderately exhaustive, and grows with such strength as to keep down weeds, so that it may be grown for many seasons on the same land. The hemp plant has escaped from cultivation in the United States and naturalized itself to some extent on waste places and in the vicinity of dwellings.

HENDERSON, a city of Kentucky, county-seat of Henderson county, is on the Ohio River, 10 miles S. of Evansville, Ind. It is on the St. Louis, Evansville, and Nashville division of the Louisville and Nashville Railroad, 171 miles E. S. E. of St. Louis. It has a court-house, churches of all the leading denominations, several newspapers and banks, and is the seat of a large trade by rail and river. Henderson is especially noted as a great centre of the tobacco business, the country around it being one of the principal seats of tobacco-culture in the United States. In the town there are many tobacco factories and warehouses. It has also railway shops, flouring-mills, saw-mills, and manufactories of farming and household implements and other goods. The country districts near at hand are richly supplied with coal and hard-wood timber, both of them as yet chiefly unwrought. Population, 5365.

HENDERSON, James Pinckney (1808–1858), an American soldier, was born in Lincoln co., N. C., March 31, 1808. He removed to Mississippi and practised law. In 1836 he was appointed a brigadier-general in the army of Texas, and when the army was disbanded he was made attorney-general. He was secretary of state of Texas, 1837–39, and then minister to England to procure the recognition of Texan independence. In 1844 he was special minister to the United States to secure the annexation of Texas. In 1845 he was a member of the State Constitutional Convention, and when the constitution was ratified was chosen governor. In the Mexican war which ensued he commanded a division of Texan volunteers. In 1857 he was chosen U. S. Senator, and he died at Washington, D. C., June 4, 1858.

HENDRICKS, Thomas Andrews (1819–1885), an American statesman, was born near Zanesville, Ohio, Sept. 7, 1819. His father soon removed to Indiana, and in 1822 settled in Shelby county. He graduated at Hanover College in 1841, studied law at Chambersburg, Pa., and was admitted to the bar there in 1843. Commencing practice at Shelbyville, Ind., in 1847 he was elected to the State legislature, and in 1850 to the State Constitutional Convention. He was a member of Congress from 1851 to 1855, and in the contest over the Kansas-Nebraska bill followed the leadership of Senator S. A. Douglas. He was commissioner of the U. S. General Land Office, 1855–59, when, as the leader of the Democratic party in Indiana, he was its candidate for governor in 1860, but was defeated by Henry S. Lane. In 1863 Hendricks was elected to the U. S. Senate, where he was conspicuous in the opposition. In 1868 he was a prominent but unsuccessful candidate for the Democratic nomination for President, and he was defeated as candidate for governor of Indiana, but in 1872, although all the rest of the Democratic ticket was defeated, he was elected governor. In 1876 he received the nomination of his party for Vice-President, S. J. Tilden, of New York, being the candidate for President. In the election following this ticket received a majority of the popular vote, but did not secure a majority of the electoral vote. Mr. Hendricks then continued the practice of his profession until 1884, when he was again nominated by the Democratic party for Vice-President, and in November was elected. He was inaugurated on March 4, 1885. He was an effective public speaker and an earnest partisan. He died suddenly at Indianapolis, Nov. 25, 1885.

HENNEPIN, Louis (*c.* 1640–1702), a French explorer of America, was born at Ath, Belgium, about 1640. Entering the Franciscan order, he travelled in Germany and Italy, and was regimental chaplain. In 1675 he was sent to Canada in company with Bishop Laval, and went to the Indian mission at Fort Frontenac, and visited the Mohawks. In 1678, being attached to Sieur La Salle's expedition, he went first to Niagara, where a vessel was built to navigate the upper lakes. By way of Lakes Erie, Huron, and Michigan they reached St. Joseph's River, crossed to the Kankakee, sailed down to the Illinois, and built Fort Crèvecœur, a little below the present site of Peoria. Hence Father Hennepin, by direction of La Salle, set out in a canoe to make further explorations, Feb. 29, 1680. They sailed north on the Mississippi, and on April 11 were captured by the Sioux. In July they were rescued by Daniel Greysolon du Luht, who had come by the way of Lake Superior. Passing down the Mississippi, then up the Wisconsin and down the Fox, they reached Lake Michigan. Hennepin went to Quebec, and thence to France, where he published his *Description de la Louisiane, nouvellement découverte au sudouest de la Nouvelle France* (1683). He was appointed guardian of a convent, but afterwards refusing to return to America he was compelled to leave France. He then sought the favor of William III., and, having laid aside the dress of his order, lived in England, where he published his *New Discovery of a Vast Country in America* (London, 1698). In this he claimed to be the first European who had descended the Mississippi to the Gulf of Mexico. The falseness of his statements was finally exposed by Jared Sparks in his *Life of La Salle.* Hennepin published other works in French, and his books were long held in high esteem. He tried also to recover favor in France and with the superiors of his order, but without success. He died in Holland in 1702.

HENNINGSEN, Charles Frederick (1815–1877), an English soldier and author, was born in 1815. At the age of nineteen he entered the army of Don Carlos in Spain and became captain of Zumalacarregui's body-guard, afterwards rose to be colonel in command of the cavalry. Being taken prisoner, he was released on parole not to serve again during the war. He then joined the Russian army in Circassia, and on his return to England published *Revelations of Russia* (1845). He proposed a plan of war to the revolutionary leaders of Hungary in 1848, but the struggle ended before the plan was put in operation. He then visited Kossuth at Kutaiyeh, and came to the United States to represent Hungarian interests. In 1856 he was major-general in Walker's Nicaragua expedition. In the American civil war he was a brigadier-general in the Confederate army and served in Virginia. After the war he resided in Washington and gave much attention to the improvement of small arms. He died at Washington, D. C., June 14, 1877. He published *Twelve Months with Zumalacarregui; The White Slave*, a novel; *Eastern Europe; Sixty Years Hence*, a story of Russian life; *Past and Future of Hungary; Analogies and Contrasts*, and other works.

HENRY, Caleb Sprague (1804–1884), an American clergyman, was born at Rutland, Mass., Aug. 2, 1804. He graduated at Dartmouth College in 1825, studied theology at Andover and New Haven, and was ordained as a Congregational minister. In 1833 he took charge of a church at Hartford, Conn., and soon afterward established *The American Advocate of Peace*, which became the organ of the American Peace Society. In 1835 he took orders in the Episcopal Church, and was appointed professor of intellectual and moral philosophy in Bristol College, Pa. In 1837 he went to New York, where, in company with Rev. F. L. Hawks, D. D., he founded the *New York Re-*

view, which they edited until 1840. From 1839 to 1852 Dr. Henry was professor of philosophy and history in the University of New York. In 1857 he removed to Poughkeepsie, and he was afterward rector of a church at Newburg. He died at Stamford, Conn., March 16, 1884. He translated and edited *Cousin's Psychology* (1834); *Guizot's General History of Civilization* (1848), and published *Moral and Philosophical Essays* (1839); *Dr. Oldham at Graystones and his Talk there* (1860); *Elements and Conditions of Social Welfare* (1868).

HERBARIUM. A collection of dried plants, for the purpose of botanical study and reference. Such collections are of the utmost value to botanists, much surpassing in value the most carefully executed drawings in the identification of plants and the study of their characters. If properly prepared and cared for, dried specimens of plants may be kept for centuries, with little loss of value to botanists. The methods of preparation are simple, there being little difficulty in the drying of plants, with the exception of the cellular cryptogams, many of which cannot be satisfactorily preserved.

The plant being gathered, and care taken to secure every part that has any systematic value, it is carefully dried, ordinarily by pressing between layers of bibulous paper, which is changed at first at frequent intervals, and afterwards less frequently, until the plant is completely dry. A wire press has also, of late years, come into use, the plant, enclosed between sheets of drying paper, being hung up in the air to dry, or exposed to the action of artificial heat. As to the value of this method there seem to be differences of opinion. In drying cellular plants, particularly the fungi and algæ, greater difficulty is presented, and it is often impossible to preserve them satisfactorily. In all cases a highly important part of the process is the poisoning of the plant, to secure it from the ravages of insects. A solution of corrosive sublimate in alcohol is the poison generally employed, and is very successful if care be taken to apply it to every part of the plant. In the Harvard herbarium arsenic acid is now used, and is claimed to be of superior value.

The dried specimen is next glued or otherwise fastened to a sheet of stiff white paper, and the name of the genus and species, the locality and date of finding, with any other matter of importance, written beneath. If the dissected parts of a flower be added, the value of the specimen is greatly increased. Thus prepared, the sheets are arranged botanically for ready reference. The species of a genus are usually placed together, and enclosed within a sheet of brown paper, they being ordinarily arranged alphabetically in American herbaria, with a name-card at the lower right-hand corner of the sheet for easy reference. The genera are arranged in their cases either alphabetically or according to their botanical alliances, as suits the taste of the collector. Families, orders, and classes are, of course, arranged in accordance with scientific classification.

The most complete herbarium in the world is that of Kew Gardens, England, which is claimed to contain about 100,000 species, and much more numerous specimens. The British Museum, and most of the more important European cities, also have valuable herbaria. Of the herbaria of the United States, by far the most extensive and important is that of Harvard College, collected by or through the agency of Dr. Gray. This valuable collection is particularly rich in North American species, of which it presents an unequalled representation. Very many of its plants are of particular importance, as being the type specimens of the species. No statement of the number of species possessed has been made public, but it is steadily increasing in extent, both by additions of new American plants and the constant increase of its rich collection of foreign species.

The American herbarium next in importance to this is that of Columbia College, the collection of Dr. Torrey. It has a high value from its numerous types of North American species, and also for the fine drawings, elucidative of structural details, done on the sheets by Dr. Torrey. It is estimated to contain 35,000 species. More recently there has been added to it a very large European collection—the Meisner herbarium—embracing some 30,000 species and the collection of Dr. Chapman; so that the complete herbarium is said now to contain over 70,000 species.

The third in value of American herbaria is the important collection of the Academy of Natural Sciences of Philadelphia. Its value is enhanced by its large number of species of early collectors, and of type specimens of early authors. Of phanerogamous plants and ferns it embraces about 25,000 species, in addition to which there is a large collection of the lower cryptogams, the total herbarium embracing from 40,000 to 45,000 species. Its main special features are the Short herbarium, a splendidly selected and mounted collection, donated by Dr. Charles W. Short, of Louisville, Ky., and a special North American herbarium, illustrative of the botany of the continent. Another Philadelphia collection, small in extent, but valuable for its great age, is that of the American Philosophical Society.

Of the remaining American herbaria there is one of considerable extent at Lafayette College, while the valuable collection of Prof. Eaton, at New Haven, is important as containing the most complete series of ferns in this country. Another large and valuable herbarium is that of the late Dr. Engelmann, of St. Louis. This will probably be deposited in the Shaw Gardens, of that city. Smaller herbaria are possessed by all the colleges of the West, of which we need only mention that of the California Academy of Science, from its rich collection of the plants of the Pacific slope. (C. M.)

HERD-BOOK. A book in which is recorded the name, sex, number, markings, date of birth, pedigree, breeder, and owner of every member of a particular breed of animals. Whenever a family of animals is established as a breed of intrinsic value, a herd-book or register becomes essential to its preservation. The individual breeder finds it necessary to preserve the pedigree and life-record of every animal born in his herd, or otherwise acquired, and his book of record becomes his *private herd-book*. If he has developed in his herd specially valuable features, by reason of which its members excel other herds of the same race of animals, then the sale of members of his herd, and the multiplication of the progeny in the hands of hundreds and thousands of breeders, in different parts of the same country or in others, necessitates the construction of a *common herd-book*, which shall include all members of the same family of pure blood wherever bred.

The herd-book is mainly of value to the breeder of stock as an evidence of that pedigree which guarantees a fixed family type, and the power of transmitting this type unimpaired to the offspring. Any pure bred family of animals has been preserved from contamination by crossing with animals of the same species, but outside the line of this family, because of some esteemed quality in which the preserved family especially excels. Thus the Arabian horse, and, still more, the English thoroughbred, are of especial value for their speed and endurance; the American trotter for his unequalled capacity for trotting; the English Shire-horse and Clydesdale for their powers of draught; the Shorthorn, Hereford, and Angus cattle for their early maturity and propensity to fatten; the Ayrshire and Holstein cattle for heavy milking; the Jersey, Guernsey, and Alderney for the abundance and quality of their butter; the Leicester sheep for early maturity, long silky wool, and heavy carcass; the different Down-sheep for the excellence of their mutton and medium wool; the Merinos for the fineness and felting quality of their wool; the Manchamp for its exquisite silky fleece; the small Yorkshire, Berkshire, Essex, and Suf folk pigs for early maturity and the delicacy of their pork; and the large Yorkshire and Poland-China for the extent and weight of their "sides." Any such specific quality of a breed is, with very few exceptions, the common property of all members of the breed, so long as the line of descent is pure and uncontaminated by any cross from another family. The greater the number of generations for which the breed has been propagated, without such a cross, the more fixed is this family or race character, and the more rarely will a deviation from it appear. (See Heredity.)

Great personal excellence in an animal is of less certain value to the breeder than that fixity of type which comes from purity of blood, and the careful breeding up to this type for many antecedent generations. The first cross, between two different breeds, is often personally larger and better than either of its parents, but he will rarely reproduce his own personal qualities, nor those of either parent with certainty, and if crossed upon an animal of pure blood, but of a race inferior to his parents, will produce offspring more nearly resembling this inferior race than either of the two races from which he himself is sprung. By the cross he has lost the "prepotency" which his parents possessed, and with it much of his value as a breeding animal. Purity of blood guards against this degeneration, and the herd-book will give assurance of this purity.

Again, among animals of valuable breed there appear some of exceptional worth, which it is desirable to perpetuate. This is accomplished by coupling the descendants of one such exceptional animal so far as is compatible with the avoidance of injury from undue consanguinity, and the more numerous the lines on which you can trace the ancestry of a given animal up to some exceptionably valuable progenitor the greater is the proportion of the blood of this progenitor in his veins, and the greater is the certainty that he will reproduce in his progeny the characters of this esteemed ancestor. Thus a colt is valued largely in proportion to the number of lines in which his blood can be traced back to Eclipse, King Herod, Henry Clay, Flora Temple, or other noted performers on turf or track. A shorthorn is valued largely in ratio with the number of lines through which he can be traced to Hubback, or to some special Duke or other valuable animal. Without a herd-book reliable information cannot be obtained.

A breeder striving to establish a special characteristic in his branch of a given breed finds that, to avoid undue consanguinity, he must draw upon another branch of the breed. The herd-book guides him at once to those families and members of the breed most nearly related to his own strain, and where accordingly he will be most likely to find individuals with the qualities he covets. Through the same guidance he can often find animals closely related to his own stock, but which have been bred for a generation or two in a different climate and on different soil, thus acquiring a sexual compatibility with their near relations in his own herd.

Again, in starting a herd, in introducing fresh blood into an old herd, or in purchasing for special personal excellence, the buyer can, by a reference to the herd-book, ascertain what families or strains of the breed have furnished the greatest number of superior animals, and by securing the best he starts with a greatly enhanced prospect of success.

The production, preservation, and improvement of valuable breeds, thus rendered possible by the help of herd-books and stud-books, has received other fostering under the paternal governments of Europe. Over the whole of that continent we find government studs and herds, the purity of which is most sedulously guarded, and the pedigrees of which are recorded in the national stud-books and herd-books. The value of these breeding-farms in distributing thoroughbred sires for the improvement of the native races has been almost beyond computation, but now, when many excellent private establishments of a similar kind have been started, the owners of these feel the pressure of government competition, and are petitioning for the abolition of the state studs. In the United States, as in Great Britain, all such advancement has been left to private enterprise, and by this the demand has been reasonably well met. Yet both countries might profitably learn from Europe, and institute a government control of all herd-books and stud-books. The compilation of such a record by a private individual or an association is confessedly liable to abuse. But our National Bureau of Animal Industry might well undertake this work, and if registration fees were fixed so low as to come within the means of all breeders, a great impetus would be given to the general improvement of live-stock and increase of national wealth.

The following is a list of herd-books, etc., for American stock, at the time of writing:

Horses.—*Thoroughbreds. English Racer.*—*American Stud Book*, S. D. Bruce, *Turf, Field, and Farm*, New York.

Trotters.—*Wallace's Trotting Register*, Broadway, New York; *Breeders' Trotting Stud Book*, J. H. Sanders, office of *Breeders' Gazette*, Chicago.

Percherons.—*Percheron Stud Book of America*, J. H. Sanders, office of *Breeders' Gazette*, Chicago.

French Draught Horses.—T. Butterworth, Quincy, Ill.

Clydesdales.—*American Clydesdale Stud Book*, C. F. Mills, Springfield, Ill.

Shire-Horses.—*Shire-Horse Stud Book of America*, Charles F. Burgess, Wenona, Ill.

Cleveland Bays.—In preparation.

Cattle.—*Shorthorns.*—*American Shorthorn Herd Book*, J. H. Pickerell, 27 Montauk Block, Chicago.

Herefords.—*American Hereford Record*, Charles Gudgell, Independence, Mo.

Holstein.—*Holstein Herd Book*, Thos. B. Wales, Jr., Iowa City, Ia.

Dutch-Friesian Herd Book.—S. Hoxie, Whitestown, N. Y.

American Branch of North-Holland Herd Book, Sanford, Warwick, N. Y.

Aberdeen—Angus.—Charles Gudgell, Independence, Mo.

Galloway.—*American Galloway Herd Book*, W. C. Weedon, Kansas City, Mo.

Jerseys.—*Jersey Herd Register*, T. J. Hand, 3 Broadway, N. Y.; *Jersey Herd Book*, O. B. Hadwen, Worcester, Mass.

Guernseys.—*American Guernsey Herd Register*, E. Norton, Farmington, Conn.

Devons.—*American Devon Record*, James Buckingham, Zanesville, O.

Red Polled.—*American Red Polled Record*, J. C. Murray, Maquokete, Ia.

Ayrshire.—*Ayrshire Record*, C. M. Winslow, Brandon, Vt.

Holderness.—*American Holderness Record*, Truman A. Cole, Salsville, N. Y.

Sheep.—*Cotswolds.*—*American Cotswold Record*, George Harding, Waukesha, Wis.

Shropshires.—*American Shropshire Record*, Mortimer Levering, La Fayette, Ind.

Southdowns.—*American Southdown Record*, S. E. Prather, Springfield, Ill.

Oxford-Downs.—*American Oxford-Downs Record*, T. W. W. Sunman, Spades, Ind.

Merinos.—*United States Merino Sheep Register*, S. C. Gist, Wellsburg, W. Va.; *Register of the Vermont Merino Sheep-Breeders' Association*, Albert Chapman, Middlebury, Vt.; *Register of the New York State American Merino Sheep-Breeders' Association*, John P. Ray, Hemlock Lake, N. Y.; *Michigan Merino Sheep Register*, W. J. G. Dean, Hanover, Mich.; *Ohio Spanish Merino Sheep Register*, J. G. Blue, Cardington, O.; *Wisconsin Merino Sheep Register*, R. J. Wilkinson, Whitewater, Wis.; *Missouri Merino Sheep Association Register*, H. V. Pugsley, Plattsburg, Mo.; *American Merino Sheep Register*, Asa H. Craig, Caldwell, Wis.; *National Improved Saxony Sheep-Breeders' Association Register*, J. H. Clark, Toledo, Pa.; *Delaine Merino Register*, J. C. McNary, Houstonville, Pa.; *Vermont Attwood Club Register*, George Hammond, Middlebury, Vt.

Swine.—*Berkshires.*—*American Berkshire Record*, P. M. Springer, Springfield, Ill.

Poland-Chinas.—*American Poland-China Record*, John Gilmore, Vinton, Ia.; *Central Poland-China Record*, W. H. Morris, Indianapolis, Ind.; *Ohio Poland-China Record*, Carl Freigan, Dayton, O.

Small Yorkshires.—*American Yorkshire Record*, G. W. Harris, P. O. Box 3432, New York City.

Chester Whites.—*National Chester White Record*, E. R. Moody, Eminence, Ky.

Duroc-Jerseys.—*Duroc-Jersey Swine Register*, C. H. Holmes, Grinnell, Ia. (J. L.)

HEREDITAMENTS. See PROPERTY.

HEREDITY. The fact of the persistence of species, the important principle that the offspring of every animal or plant resembles its parents in its general characteristics, is one that has been long recognized, and forms the basis of organic classification. It has given rise to the doctrine of the immutability of species, a doctrine which is attacked by modern evolutionists, who declare that the resemblance of offspring to parents is never complete, and that the slight but incessant deviations may accumulate until a difference of species is established. The controversy which has been long and bitterly waged upon this point is largely based on the facts of heredity. These facts it is our purpose to briefly consider, as established by recent research.

Two things are undisputed: first, that the distinctive characters of a race are repeated in its descendants almost undeviatingly; second, that within the limits of the race individual deviations are of constant occurrence. But close research has been necessary; first, to establish to what degree living beings repeat themselves in their descendants; second, to discover the law of this repetition. We can but give some general results of this research into the facts and principles of heredity. We shall first consider the facts of resemblance, and afterwards those of difference.

The resemblance of children to their parents is a fact of general observation. In some cases the likeness is extraordinarily close, so that, but for difference in age, the child could not be distinguished from one or other of its parents. Usually the likeness is less exact, and while there are traceable resemblances to one or both parents, there are well-marked differences. The most generally observed heredity is of external structure. This embraces resemblance in features, complexion, size, and shape of body, obesity or leanness, and many minor peculiarities of less noticeable character. For instance, such a minor character as a notch or depression in the thumb-nail has been known to be transmitted through several generations of a family. Anomalies of structure are equally persistent. In the case of Edward Lambert, the "porcupine man," whose whole body was covered with horny excrescences, this peculiarity was transmitted to his male descendants for five generations. So the anomaly of six fingers and toes has been transmitted through four generations. Both these features might have been indefinitely persistent but for intermarriage with normal individuals, and the consequent action of normal influences.

A less observable phase of heredity is of internal structure. The proportions of the bones and of the organs of the body are transmissible characters. In some families the heart and the main blood-vessels are very large. In others they are small. Some families are fuller blooded than others. So a great or a small development of the nervous and the muscular systems are transmissible characters. Closely related to this is the hereditary character of certain diseases. These are such as are due to constitutional weaknesses in one or other of the body tissues, these weaknesses, and the consequent liability to the accordant disease, being transmissible. Less directly dependent on structure are other hereditable characteristics, such as fecundity, length of life, and personal idiosyncracies, well-marked instances of each of which are on record. Though the average life of man depends on more general causes, there are families in which both long life and short life are hereditary. In the Turgot family, for instance, the fifty-ninth year was rarely passed; though apparently in good health and strength, the members of that family almost invariably failed and died before reaching that age. In other families, through successive generations, the general life-period will range well up towards the hundred. So we may name among the hereditary qualities immunity from contagious diseases, bodily activity and strength, grace of movement, powers of voice, keenness of sight, or of some other sense, and special peculiarities in these and other characteristics. There are also on record many cases of the inheritance of special habits. Even such a personal peculiarity as a style of handwriting may be transmitted.

If now we consider the mental powers of animals, the influence of heredity is similarly apparent. A striking instance of it is the heredity of instincts in the lower animals. This is remarkably displayed in the long-continued transmission of the highly complex instincts of ants and bees. In like manner newly-gained habits may be transmitted through many generations, as we perceive in the persistence of habits in breeds of trained dogs, etc. In regard to the intellectual qualities the instances of heredity are very numerous. The resemblances of a child to its parents in propensities, passions, mental tendencies, etc., are too numerous and evident to be here dwelt upon. Close observation has traced many instances of inheritance of the higher intellectual powers. Thus, in regard to the imagination, there are long lists extant of poets, painters, musicians, and novelists in whom the faculty descended through two or more generations. The same may be said of general literary or scientific tendency, of logical and mathematical powers, etc. Instructive lists of this kind have been made by Galton and others, with the result of proving that genius may be heritable. Less desirable mental conditions may be similarly transmitted, such as the alcohol habit and the tendency to insanity, of which there are many instances. There are recorded cases where lunacy was transmitted through eight and even through eleven generations. The tendency to commit suicide seems similarly transmissible, as it has been traced through four generations. Aristocratic pride is another inheritable quality, and the list might be extended to cover every phase, minor and major, of the physical and mental characters of animals. In fact, in nations where little, or no mingling with external peoples has taken place, peculiar national characters arise, which are transmitted as truly as are family characters. This is strongly manifested in such isolated peoples as the Jews, the Gypsies, and the Chinese, and is manifest in a lesser degree in all distinct nations, members of which can usually be recognized by some peculiarity of body or mind. The same principle strongly applies to the distinct races of mankind, such as the African, the Mongolian, the Aryan, etc. Their distinctive peculiarities are transmitted to millions of descendants, who have "bred true" through very many generations. That this long persistent inheritance is in any sense a result of chance, no sane person will for a moment maintain. That it is due to some principle of heredity, inherent in all organic beings, is too evident to be disputed. Maupertuis cites a case of sexdigitism which was transmitted through four generations. This was in a city of 100,000 inhabitants, in which he found but one other case of this anomaly. Estimating from these data the probability of its transmission by chance to a second generation, he found it to be but 1 in 20,000. The probability of its transmission to the third generation became 1 in 400,000,000; and to the fourth, 1 in 8,000,000,000,000. This calculation removes the problem of heredity from any theory of chance, and relegates it to the domain of natural law.

We have next to consider some other phases of the principle of heredity. As every child has two parents it is simply impossible that he should resemble both. If intermediate in form and character, he can exactly resemble neither. This is one cause of differentiation. In the case of hermaphrodite animals the offspring very closely resemble the single parent. In dual parentage, though the characters of the offspring are very seldom exactly intermediate between those of the parent, and usually strongly deviate towards one parent, an exact resemblance is in nearly every case prevented by some degree of influence from the other parent. Instances of every possible case of transmission of parental characters may be found. Thus the characters of the father sometimes descend to the son, sometimes to the daughter. So the characters of the mother may reappear now in male and now in female children. Cases of this kind are known as direct heredity. Other cases are those of reversional heredity or atavism, and of collateral or indirect heredity. Atavism is a case in which a child resembles one of its grandparents, or a more remote ancestor. Indirect heredity is less common, and applies to resemblance to an aunt or uncle, a nephew or niece, etc. The latter case is, at first sight, puzzling, yet it is probably but a more extended case of atavism, the characters simulated having been derived from some distant ancestor common to both parties. There are cases on record where characters which are traceable to some exceedingly remote ancestor have appeared. These seem to indicate a partial arrest of development in the individual.

Having thus considered the case of resemblance we have next to consider that of difference—the exceptions to heredity, which are as numerous as the accordances. These exceptions are partly due to the influence of both parents upon the child, since a compound of two unlike elements must differ from either. A new combination is also produced by the sexual influence. A female child, for instance, may resemble its father in many particulars of form and mentality, yet it must resemble its mother in certain dominant characters of structure and mental tendency. The principal of differentiation here considered, however, is not the cause of the great diversity in organic beings. If acting alone it would tend to produce homogeneity, the greatest original diversity being gradually obliterated by the constant transmission of intermediate characters to offspring. Under such a principle alone the great homogeneity of hermaphrodite animals could never have become the existing heterogeneity of advanced organisms. There is very evidently some other law of differentiation active, through whose influence all offspring tend to differ from their parents, these differences being usually slight, but occasionally considerable. By their accumulation they overcome the tendency to homogeneity, and produce an increasing heterogeneity. This is added to by the influences already considered in two ways. First by the union of parents of marked differences in organization, whose offspring, even if intermediate, must be strongly individualized. And here two results of experience may be mentioned. If the parents are too greatly unlike in organization no offspring will be produced, or the offspring will be an infertile hybrid. If they are too closely similar in organization, the offspring is liable to be defective in some particular, either of body or mind, as if parental similarity had caused partial or local arrest of development. Thus it has become apparent that a certain degree of difference in temperament and bodily organization, but not too great a difference, is necessary to the best results of sexual union, and that close breeding is apt to yield imperfect offspring, and the union of unlike species to result in infertility. The other general cause of heterogeneity is the gaining of new habits, structural peculiarities, or mental tendencies during the life of the individual, since all such new-gained characters are transmissible, and may produce in the offspring marked changes from the family characteristics. These individual variations, as ordinarily observed, are such as take place during the youth or maturity of the person, and are the results of the action of physical and mental influences upon his body and mind. But it is quite conceivable that similar warping influences may act upon the embryo in its uterine development, and that from the period of fertilization of the germ-cell the growing organism may be subject, even within the body of the mother, to the action of disturbing forces, which produce changes in its organization. Various instances of evident interuterine variations are on record.

That the variations of offspring from parents are due in a considerable measure to the causes above outlined cannot be denied. But that they are due only to these causes cannot be affirmed. There is evidently some principle of variation acting at a lower level in the life history, some force which acts upon the germinal cells of both parents, and so affects these that, while capable of developing into close counterparts of the parental individuals, they have innate tendencies to diverge in certain particulars, and to produce new individuals possessed of characters of organization which are not present in either parent. What this warping principle is remains a mystery. We are confined here to a review of its effects.

A very common divergence in the offspring from its parents is in respect to size and general form. Thus parents of middle height may produce tall children. Others again, of average size, and good health and constitution, may produce offspring of low or dwarfed stature. Thus Bebe, the famous dwarf of King Stanislas, 33 inches high, had well-formed, vigorous parents. The celebrated Polish dwarf, Borwslaski, 28 inches high, had a dwarfed brother and sister, and three other brothers each 5 feet 6 inches high. Other cases of marked differentiation are numerous. Harelip, polydactylism, etc., arise as exceptions, though they afterwards become heritable factors. The case above mentioned, that of Edward Lambert, the porcupine man, arose as an exception from normal parents. Minor exceptions are of every-day occurrence. A remarkable instance of this principle is seen in the case of twins. Here there is often a close resemblance, but often also a strongly marked difference, despite the fact that during gestation they have been exposed to the same influences, and the presumption that the germs must have been formed under similar conditions. Even in double monsters the same differentiation appears. As one instance may be mentioned that of Ritta and Christina, the joined twins of Presburg, of whom one was handsome, gentle, and sedate; the other ugly, ill-conditioned, and quarrelsome. Chang and Eng, the Siamese twins, were also different in appearance and character, though not to the same extent. As above observed the cause of this difference must have acted upon the germs during their original formation. As to the germinal conditions of joined twins we are greatly in the dark.

Another frequently observed and highly important instance of differentiation is that in the mental powers and faculties. Great intellectual power has frequently arisen as an anomaly. In the case of the great men of the world, in some instances one or both parents were above the average in mind. In other cases there is no evidence of this. And as a rule in such cases the parents have been below their offspring in intellectual powers. Like other anomalies, if it may be regarded as such, this of great intellect is transmissible. But in no instance can it be traced beyond two or three generations. The descendants of great thinkers quickly descend to the common plane in intellect, and often the descent is as sudden and great as was the rise. The greatest men of the earth usually stand alone, with no family link of greatness above or below. We have spoken of extreme intellectuality as an anomaly. And it is certain that children of abnormal brain development, and very active intellect even during childhood, are not infrequent. As a general rule they die young from some brain disease. Yet occasionally such infant prodigies survive to astonish the world by their powers of mind.

One thing the whole history of mankind and of organic nature teaches us, that divergences from the average condition of a species or race are not persistent. The principle of heredity exerts a stronger force than the opposing principle. We perceive individuals incessantly diverging from the average condition of body or mind, yet their descendants are quickly brought back, and the characters of the race are maintained with a persistence which shows the vigorous influence of heredity. This, of course, is very largely due to the unlimited sexual union of persons of every condition of organization, so that divergence in one direction is overcome by the influence of divergence in another. In consequence, in all the races of organic beings below man and the domesticated animals and plants, the action of heredity is the dominant power, and permanent divergence from the line of a species only appears at long intervals and under exceptional circumstances. In the breeds of domesticated animals and the varieties of cultivated plants the opposite rule holds. Divergent individuals are isolated, promiscuous union prevented, and their peculiarities sustained by close breeding, so that the effects which nature produces after many centuries, and by chance, man produces in a few years, and by design. The numerous persistent breeds of dogs, pigeons, and other domestic animals, and varieties of cultivated plants, are marked results of checking the full action of heredity, and favoring that of divergence, so as to give the latter a supremacy which it does not possess under natural conditions. A similar effect is produced in man, to a lesser degree. The separation of peoples into castes or classes acts as a sort of in-and-in breeding, and yields well-marked varieties. A common instance is the strong difference in body and mind between the members of a nobility and those of the peasantry of the same nation. Yet in nearly every case of a nobility its limitation in numbers and close intermarriage yield the evil effect of too great similarity in organization, with the result of a mental and physical degeneration, and a thinning out in members, so that, in the words of Niebuhr, "aristocracies obliged to recruit their numbers from among themselves become extinct, in the same way often passing through degeneracy, insanity, dementia, and imbecility."

A similar isolation may take place in the case of a nation, with the preservation of special national traits, such as the imaginative intellectuality of the Greeks, the cruelty and warlike spirit of the Romans, the trading tendency of the Jews, and many other characteristics which might be cited. This influence of national heredity is very strong in the older nationalities, and was much stronger in the past than now, from the influence of greater isolation. In these old nations class distinctions are rigidly maintained, the propensities of families are strengthened by legal restriction, prejudices act to check deviations, trades and beliefs are heritable obligations, while sharp hindrances to freedom of thought and action exist. This influence which tends to produce special breeds and varieties of men within the limits of a nation is least active in the United States, where classes, sects, and prejudices have no rigid existence, where the individual is not the slave of old laws and habits, and may change his condition without social or legal restriction, and where the mingling of peoples is not confined to the members of a single nationality, but includes representatives of all the civilized and some of the uncivilized races of mankind. As a consequence strict family heredity is strongly overcome in the United States, and men are not isolated into classes or breeds, while the principle of individual divergence is allowed its fullest exercise, and takes the place of class divergence elsewhere.

The differences between nations in physical and mental character, however, are not of primitive origin. They have been produced by the slow accumulation of divergences of individual origin, and preserved by heredity. If we consider these differences closely it will be to find them more mental than physical, and very largely due to the action of circumstances on the individual. They are not in opposition to the law of heredity, but simply produce new transmissible characters, which, by their slow accumulation, constitute a new national character. But circumstances, education, and natural influences exert less influence upon the body than upon the mind. The physical characters of races are very persistent. They vary slightly but slowly, and while peoples of the same race origin, dwelling under different circumstances, may present observable physical differences, their racial likeness is seldom overcome. The mind is more plastic, is exposed to a greater variety of influences, and special divergences are produced in it by educational training. In consequence separate nations present much stronger mental than physical divergences, and we may perceive growing up in the members of an original race, in a few centuries, such strong mental differences as existed between the Greeks and Romans.

The fact is, heredity acts more vigorously on the body than on the mind. The child receives his complete body from his parents. He receives only the germ of his mind. His individual mental stores must be gathered by himself, and may be of a character to considerably transform his inherited mental strain. Yet the germinal mental tendencies are very vigorous, and yield but slowly to transforming influences. The possible extent of mental development is also strictly limited by hereditary conditions. Thus the brightest offspring of the savage races are incapable of attaining the intellectual development of an average Aryan, despite all efforts at education. "In childhood," says Sir Samuel Baker, "the young negro is more advanced than the white of the same age, but his mind does not bear the fruit of which it gave promise." "In New Zealand," says Thompson, "children of ten years are more intelligent than English; still very few New Zealanders are capable of receiving in their higher faculties a culture equal to that of the English."

To summarize briefly, the influence of heredity on organic beings, while the most powerful of the agencies active in organic nature, is not all-dominant, its action being subject to several opposing agencies which produce steadily increasing divergences, and yield varieties, races, and, as many maintain, species and genera, and all the existing variations in the organic kingdoms. Of these diverging influences a very strong one is the action of natural agencies on the individual, both before and after birth, with the effect of producing new inheritable qualities. Another is the sexual union of individuals of bodily and mental divergence, yielding young who are specialized by the combination of characters derived from two unlike individuals. A third is the action of some untraced principle of divergence which acts on the germ cell during its original formation, side by side with the principle of heredity, so that, while there is instilled a strong inherent tendency to repeat the characters of the parent, there is instilled a like inherent tendency to diverge in certain particulars, and to produce characters in the offspring not existent in either parent.

The influences here considered are those which have controlled the whole evolution of organic nature, in the creed of modern evolutionists, and have produced the extraordinary variety of living beings which now exist side by side with the strong persistence of family and race characteristics. The plastic life substance and mental faculties of organic beings have steadily yielded to the force of influences internal and external, and have gained new forms and conditions despite the action of a highly vigorous principle of heredity.

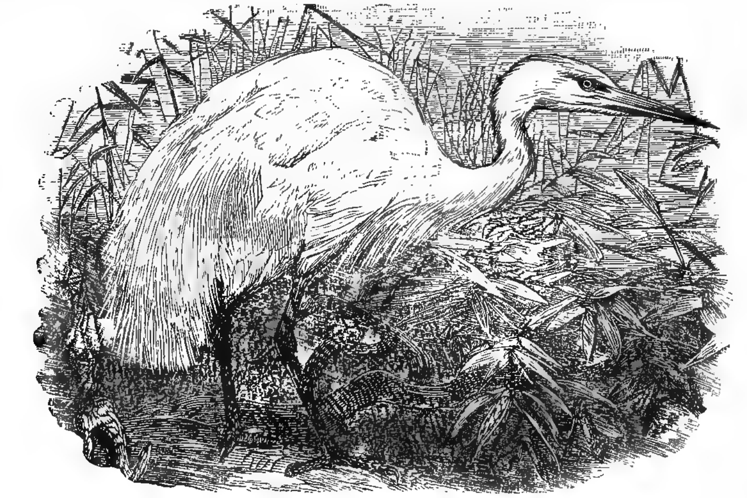
(C. M.)

HERING, CONSTANTINE (1800–1880), an American physician, was born at Oschatz, Saxony, Jan. 1, 1800. He studied medicine at Leipsic and Dresden and in 1826 received his degree at Würzburg. He was afterwards sent on a scientific expedition to Dutch Guiana, and in 1834 he settled in Philadelphia, where he gained an extensive practice. He was the first to introduce homœopathy in the United States and was long the most prominent advocate of that system. His first work was *The Rise and Progress of Homœopathy* (1834), which has been translated into several languages. He also published *The Domestic Physician* and *American Drug-Provings*, which were also issued in Germany. Dr. Hering also contributed to homœopathic reviews and journals. He died at Philadelphia, July 23, 1880.

HERKIMER, Nicholas (*c.* 1725–1777), an American Revolutionary soldier, was the eldest son of J. J. Herkimer, a Palatine, and one of the original patentees of Burnet's Field in what is now Herkimer co., N. Y. He was appointed lieutenant of militia, Jan. 5, 1758, and commanded Fort Herkimer during the attack of the French and Indians in that year. In 1775 he was colonel of a battalion and chairman of Tryon county committee of safety. In September, 1776, he was made brigadier-general, and when Col. St. Leger, sent out by Gen. Burgoyne, was besieging Fort Schuyler, Herkimer with 800 militia marched to its relief. At first he proceeded cautiously, but being urged to proceed more rapidly he fell into an ambuscade at Oriskany, Aug. 6, 1777. He was soon wounded, but continued to direct the fight for five hours. A sortie from Fort Schuyler relieved his men after a loss of 200. Herkimer died from the effects of his wound, Aug. 11, 1777. At the centennial anniversary of Oriskany his statue was ordered to be erected.

HERKOMER, Hubert, an English painter, was born in Waal, Bavaria, in 1849. His father was a wood-carver, who, after a residence of six years in the United States, settled in 1857 at Southampton, England. After studying in the art school there and at South Kensington Hubert settled at Hythe in 1868, and exhibited two pictures in the Dudley gallery in 1869. The *London Graphic* in 1873 published the first sketch of his Chelsea Pensioners, the oil-painting of which was highly successful when exhibited in 1875. Eventide, showing a group of old women at the workhouse, may be considered a companion piece. He has executed other pictures in which he shows the same combination of pathos and humor in delineations of the aged.

HERNDON, William Lewis (1813–1857), an American naval officer, was born at Fredericksburg, Va., Oct. 25, 1813. He entered the navy in 1828, served on various cruises and in the Mexican war, and was afterwards engaged for three years in the observatory at Washington with his brother-in-law, Lieut. M. F. Maury. In 1851 he was sent to explore the Amazon River, and reaching its headwaters by crossing the Andes from Lima, he sailed down it in a canoe. Two volumes were published by the U. S. Government, the first by Herndon and the second by his associate Lieut. Lardner Gibbon, under the title, *Exploration of the Valley of the Amazon* (1853–54). Herndon was commander of the steamer Central America, which sailed from Havana for New York, Sept. 8, 1857, with 474 passengers, 105 sailors, and about $2,000,000 in gold. During a violent storm she sprang a leak, and sank on Sept. 12 in the Gulf stream in N. lat. 31° 44′. All the women and children were put in boats and with a few men were saved. Herndon and 426 men sank with the vessel. Pres. Arthur's wife was a daughter of Capt. Herndon.



Heron—Egret (*Ardea egretta*).

See Vol. XI. p. 679 Am. ed. (p. 760 Edin. ed.).

HERON, the name generally applied to a large series of wading birds, of the family *Ardeidæ*, which includes many species, and is found in all the tropical and temperate regions of the earth. The true herons belong to the sub-family *Ardeidæ*, and in particular to the genus *Ardea*. They are tall birds, with very long neck and legs, and a long, sharp-pointed bill. The neck contains from 15 to 17 vertebræ. As a rule the head is partly or wholly naked. The tibia is naked below, the toes long and slender, and never fully webbed. The tail is short, and contains 12 broad and stiff feathers. The wings are long, broad, and ample. The peculiar feathers known as powder-down find their highest development on the herons. They occur on some other birds in a single pair, while *Ardea* has three pairs of powder-down tracts. The bill is longer than the head, straight, or nearly so, and with sharp-cutting edges. It is used to grasp their prey, the birds standing solitary and motionless for hours by the water, watching for passing fish, which are caught by the darting bill. They often perch on trees, where their nests are usually built. The birds sometimes breed singly, but oftener in great heronries, to which they return year after year.

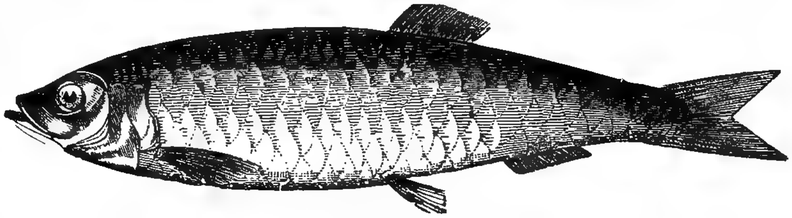
In ordinary language the various types of *Ardeidæ* are known as herons, egrets, bitterns, night herons, and boatbills. These have been variously subdivided into genera, some writers retaining all but the boatbills in the genus *Ardea*, while others divide them up into several genera, and even separate the bitterns as a distinct sub-family. There is, in fact, very little variation in form between the species, and it is a difficult matter to classify them properly.

The herons are well represented in North America, comprising several large and abundant species. Among the most marked of these is *A. herodias*, the great blue heron, a species 4 feet in length, and nearly 6 feet in spread of wing. It extends throughout North America and into Central and South America. A still larger species, which belongs to the group of egrets, is *A. occidentalis*, the great white or Florida heron. It is 4½ feet long, with 7 feet extent of wings. A somewhat smaller species, *A. egretta*, or *Herodias egretta*, the great white egret, of 36 to 42 inches long, is of interest from its magnificent train of very long plumes of decomposed feathers, which droop far over the tail. *A. candidissima*, or *Garzetta candidissima*, the little white egret, has similar plumes, as also a long occipital crest of the same character. Both these species inhabit the Southern States, though occasionally straggling to the north. There are several other American forms, belonging to the different groups, but the above-named are the most important. (c. m.)

See Vol. XI. p. 683 Am. ed. (p. 764 Edin. ed.).

HERRING, a highly important food-fish, comprising several species of the genus *Clupea*, a genus with considerable analogy to the *Salmonidæ*, yet differing in the absence of an adipose dorsal fin. The body is well scaled, the scales being sometimes very large. The jaw is formed as in the trout, in the middle by intermaxillary, and on the sides by the maxillary bones. The mouth is variously provided with teeth, these occurring sometimes on the pectinated tongue. The family comprises several of the most useful and indispensable of food-fishes, including the sardine, anchovy, sprat, shad, and various herring, all of which are very abundant. In the genus *Clupea* the body is compressed, the scales large, thin, and deciduous, the head compressed, the teeth minute or lacking. It has a single dorsal fin. The abdominal line forms a sharp, keel-like edge. The common herring is a beautiful fish, being highly iridescent when first taken from the water. Its back is of a deep-blue tinged with yellow, the side silvery with metallic reflections, the lower portion silvery. The body is elongated, fusiform, compressed, the eyes large and circular; length 12 to 15 inches. Its distinguishing feature is a patch of very small teeth on the vomer, or centre of the palate. The common American herring has been classified as a distinct species, under the name of *Clupea elongata*, but is now considered to be identical with *C. harengus*, the European species. Jordan, in his synopsis, date 1883, gives the American species of *Clupea*, as *C. harengus* (the common herring); *C. mediocris* (hickory shad, tailor herring, fall herring); *C. vernalis* (alewife); *C. æstivalis* (blue-back, glut herring); and *C. sapidissima* (shad). But it must be noted that earlier writers do not include all these in one genus.

As to the natural history of the herring great uncertainty prevails. It was formerly supposed that they were a migratory species, descending annually in enormous shoals from the Arctic Seas to the shores of Northern Europe and America. This is now known to be an error. Herring are found in no abundance in the Arctic Seas. It is also found that those which visit each coast have some peculiarity, as of size, fatness, etc., tending to show that each is a separate brood. It is now believed that their habitat is the deep-sea region, off the immediate coast, which they visit annually for the purpose of spawning, and for other purposes, since shoals frequently appear which are not in spawning condition. They can, in fact, be caught all the year round on the British coasts, and on the Northern American shores, though the great shoals come in only at fixed periods.



The Herring.

These shoals sometimes contain enormous multitudes of fish. Their dense ranks have been traced to a length of 8 to 10 miles, by 2 to 4 miles wide, and of unknown depth. Yet great variations take place in the numbers in different years, they being in some seasons countless, in others very limited; while the individuals will now be very lean, now large and fat. This may be partly due to annual differences in the food-supply, though perhaps principally to destruction of spawn and young fish by the many enemies of the herring. A seeming scarcity is also often caused by a change of habitat, the shoals deserting old and seeking new spawning-grounds—a habit which belongs to nearly all migrating food-fishes.

The food of the herring consists of small fish and crustaceans, and other minor ocean-life forms. Its variation in quality in different localities is probably mainly due to differences in the character of its food. Herrings breed with great rapidity, and are so prolific that their numbers do not seem to be reduced by the annual raids made upon them. They are less exposed to destruction in their deep-sea life, and enough of the young escape to repair the annual ravages. Thus the herring serves as a means of rendering available as food the abundant stores of minor life of the ocean, which otherwise would be useless to man. The catch of herrings by man is frequently enormous. In some cases as many as 50,000 have been taken in one cast of the net. The total catch of 1873, by the boats of Yarmouth and Lomestofft, was 422,400,000. Yet the whole number taken by man is insignificant as compared with their destruction by their other enemies. On the approach of the shoals to land they are usually followed by hordes of hungry foes. Whales of several species rush through and make havoc in their ranks. The dog-fish and other voracious fish assail them. Great flocks of fishing-birds hover above, and dart down for their finny prey. But the most destructive of their enemies in American waters is the blue-fish, which kills ten times as many fish as it needs, and, according to Prof. Baird's calculation, must destroy 300,000,000,000 food-fish yearly. Compared with this the destruction by man is trifling.

The European herring-fisheries extend from the most northerly extremity of Scandinavia to the British Islands and the coast of Normandy, south of which the herring is seldom found. In Great Britain 100,000 men are employed in this industry, with 3000 vessels and a great number of small boats. The Dutch fishery, which once supplied Europe with cured herrings, has now greatly declined, while the Scotch fishery, which was unimportant a century ago, has taken its place. The Dutch do not cure now more than 20,000 barrels, while the Scotch cure annually more than 500,000 barrels. These vary greatly in quality according to the season of the catch, the spring herrings being very poor, the midsummer run larger and fatter, while the true "harvest of the sea" is that which begins in September and lasts till Christmas. In addition to the localities named the herring-fishery is an important industry of England, Ireland, France, Denmark, Norway, and recently of Iceland.

On the Atlantic coast of North America, and particularly in the waters of Maine and Nova Scotia, the herring-fishery is important, being only surpassed by those of the cod and the mackerel. *C. harengus* is mainly confined to the northerly locality, where it is caught in great numbers. The fishing is done with nets, both drift or gill nets and seine nets being used. In this region the annual shoal makes its first appearance in the month of March, the product of the early catch being principally consumed as bait for the cod and other line fisheries. The more important market fishing does not commence until May. In this month a run of large fat herring is taken in nets on the banks, which lie 10 to 15 miles seaward and are about 75 fathoms deep. The nets used are 30 fathoms long and 3 deep. They are passed out from the anchored boat, the free end drifting backward and forward with the tide from evening till morning. The ordinary nightly catch is from 20 to 100 dozen per net. This fishing is very precarious, from the distance from shore and the need of fair weather. The inshore run of smaller-sized fish is taken in nets set to a buoy and left to drift, or else moored from one buoy to another across a creek or small bay. A small but very fat variety of herring visits the Bay of Fundy in the month of May, and is caught by the aid of herring weirs, a fish-gate over a shallow, which permits the fish to enter at high tide, but is bare at low tide. The extraordinary tides of this bay render this method very successful, and from 150 to 250 hogsheads of herring are frequently captured in a single tide. A considerable variety of such weirs is in use on the north-east coast of America, and a great multitude of herrings thus caught.

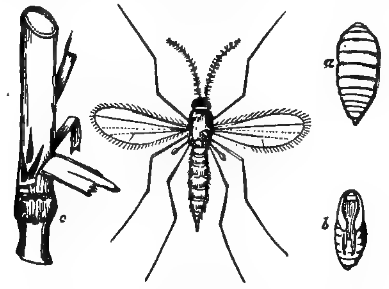
The herring catch of the States south of Maine is also very considerable, and consists mainly of the species known as the alewife, which differs from *C. harengus* in ascending the rivers to spawn. This species (*C. vernalis*) is from 8 to 12 inches long, and in no sense inferior to the common herring, which it much resembles. It is found plentifully in the rivers from New England to North Carolina, and very abundantly in the southerly part of this region. It was formerly so abundant on the coast of North Carolina that, according to Pennant, the inhabitants flung it ashore by shovelfuls. It left the salt water in March and ran up the rivers and over the shallow fords in such multitudes that travellers trampled many under foot while crossing the fords. In Maryland and Virginia it has been caught so abundantly as to be used for manure. A seine at the mouth of the Chowan River, N. C., 1½ miles long, and worked by steam, has taken as many as 300,000 herring in a day, together with 1000 to 2000 shad. It is still the custom of the North Carolina and Virginia farmers from the back counties to visit the coast annually for a supply of herrings to salt down. A large portion of the catch is thus disposed of. (See ALEWIFE.)

On the Pacific coast the principal species of herring is *C. mirabilis*. In size, appearance, and habits this species closely resembles the common herring, differing in some anatomical points. It is somewhat smaller, but is said to be of equal flavor. It occurs in great abundance, and the fishery promises to soon become important. At present it is most actively prosecuted in British America. The product of the American sea-herring-fishery for the year ending June 30, 1885, is given at 109.701 cwts. of cured fish, valued at $150,097. This is in addition to the very large number consumed fresh. The Canadian fisheries are considerably more prolific, the value of the Nova Scotia catch in 1876 being given at $4,128,000.

Herrings are largely consumed fresh, or partly cured for immediate use, in which state they are known as *bloaters*. But the principal part of the catch is cured, either by salting or by smoke-drying. In the former state they are known as white, in the latter as red herrings. Thus preserved they form a highly important part of the food of man, and one that is not likely to be exhausted, since the habits of the herring save it from danger of serious reduction by human fisheries. Its finny enemies are a hundred-fold more destructive than man, though they probably do less injury to the spawn. The name *herring* is said by Pennant to be derived from German *heer*, an army, a title significant of their extensive migrations. (C. M.)

See Vol. XI. p. 697 Am. ed. (p. 781 Edin. ed.).

HESSIAN FLY (*Cecidomyia destructor*, Say). It is quite generally accepted by entomological writers that the Hessian fly was originally an European insect and was first introduced into this country at the time of the Revolutionary war, yet some consider the species indigenous, and at this late date the question cannot well be decided. At present it occurs throughout all the Northern States, as far west as Kansas and Minnesota, and as far south as the northern portion of the Gulf States. The adult is a delicate, two-winged midge, and the larva an orange-colored, footless maggot from 2 mm. to 3 mm. in length. There are two broods in the course of a year throughout the great wheat-section of the country, but a third, or an attempt at a third, in the more Southern States. The eggs of the first brood are laid in April or May, and those of the second usually in September. Each female lays about thirty eggs on the leaves of the wheat, and the larvæ, after four days, hatch and make their way down between the stalk and its sheath, near the base, causing the plant to swell, turn yellow, and die. At the end of from four to six or seven weeks, according to the temperature, the larvæ assume what is called the "flaxseed" state, in which the larva hardens so as to form what has been known as the coarctate pupa, but which is more correctly termed the coarctate larva. Within the shell the final larva lives for a while, and then transforms to the pupa and finally to the imago state. Hibernation takes place in the "flaxseed" state.



Hessian Fly.

a, larva; *b*, pupa; *c*, stalk showing "flaxseed" state; *d*, female fly—all enlarged but *c*. (After Fitch.)

Five parasites have been mentioned as attacking the Hessian fly, and these are said to destroy about nine-tenths of the larvæ hatched. But one of these—*Semiotellus destructor* (Say)—has been identified. Packard claims, in an egg-parasite, to have discovered the *Platygaster error*, Fitch; but this is doubtful, as Fitch's description is very scant.

Remedies.—Late sowing (after Sept. 20) has been recommended, and this is improved upon by sowing early a small patch or a narrow belt around the field to act as a trap. Where the field is only partly affected, careful cultivation and the use of fertilizers will cause it to recuperate. Pasturing with sheep in November and early December will cause the destruction of many of the hibernating puparia. The *Lancaster*, *Clawson*, *Diehl*, *Underhill*, and *Mediterranean* varieties resist the work of the Hessian fly more effectually than do the more delicate varieties. (C. V. R.)

HETH, HENRY, an American general, was born in Virginia in 1825. He graduated at West Point in 1847, and entered the Sixth infantry. He rose to be captain in March, 1855. On the secession of Virginia he resigned and entered the service of that State as a brigadier-general. He was promoted major-general in May, 1863, and commanded a division in Gen. A. P. Hill's corps in Virginia. He fought at Chancellorsville, Gettysburg, and in the campaigns of 1864–65. He surrendered with Gen. Lee.

HEWES, JOSEPH (1730–1779), an American patriot, was born at Kingston, N. J., in 1730, of Quaker parentage. He was educated at Princeton, and was a merchant at Philadelphia, and also at Edenton, N. C. In 1763 he was elected to the colonial legislature of New Jersey, and in 1774 was sent to the Continental Congress. In 1776 he was one of the signers of the Declaration of Independence, and was at the head of the naval committee. In 1777 he declined a re-election, but resumed his seat in July, 1779. His health failing, he resigned Oct. 29, and died at Philadelphia, Nov. 10, 1779.

HEWIT, AUGUSTINE FRANCIS, an American clergyman, son of Rev. Nathaniel Hewit, D. D. (1788–1867), was born at Fairfield, Conn., in 1820. He graduated at Amherst College in 1839, studied theology at East Windsor, Conn., and entered the Episcopalian ministry. While holding a charge in North Carolina in 1846, he became a Roman Catholic, and was ordained in that church in 1847. He joined the order of the Paulists in 1848, and was appointed professor of philosophy, theology, and Holy Scripture in the Paulist Seminary in New York city. He has been active as an author and has published *Problems of the Age; Light and Darkness*, and other works.

HEWITT, ABRAM STEVENS, an American statesman, was born at Haverstraw, N. Y., July 31, 1822.

He graduated at Columbia College in 1842, and studied law, but, his eyesight failing, became a manufacturer of iron at Trenton, N. J. He was a commissioner to the French Exhibition of 1867, and made a report on "Iron and Steel." He married a daughter of Peter Cooper, his partner, and has been secretary of the Cooper Union for the Advancement of Science and Art since its incorporation in 1859. He was elected to Congress in 1874 as a Democrat from the Tenth district of New York, and served two terms, declining a nomination in 1878. He was again elected in 1880, and is still a member. He is an expert on all matters relating to iron manufacture, and is a strong advocate of free trade.

HEYWARD, THOMAS (1746–1809), an American statesman, was born at St. Lukes, S. C., in 1746, being the son of Col. Daniel Heyward, a wealthy planter. He was educated in London, and studied law. Returning home, he was elected to the Continental Congress of 1775, and was one of the signers of the Declaration of Independence. In 1778 he was appointed a State judge, and in 1779 served again in Congress. He was captured at the surrender of Charleston in 1780, and was sent prisoner to St. Augustine, Florida. After he was released he resumed his office as judge until 1798. He died in March, 1809.

HICKOK, LAURENS PERSEUS (1798–1876), an American philosopher, was born at Bethel, Conn., Dec. 29, 1798. He graduated at Union College in 1820, studied theology and held pastorates successively at Newtown, Kent, and Litchfield, Conn. He was appointed professor of theology in Western Reserve College in 1836, and in Auburn Theological Seminary in 1844. He was made vice-president of Union College, Schenectady, N. Y., in 1852, being also professor of moral and mental philosophy. From 1860 Dr. Hickok had sole charge of the college, although he was not formally inducted into the presidency until the death of Rev. Dr. Eliphalet Nott, the former president, in 1866. At the age of seventy Dr. Hickok retired from public work and took up his residence at Amherst, Mass., where he devoted himself to philosophical study. He died June 10, 1876. He published many theological and philosophical articles in the *Bibliotheca Sacra*, *Princeton Review*, and other reviews. His works comprise *Rational Psychology* (1848); *Moral Science* (1853); *Empirical Psychology* (1854); *Creator and Creation* (1872); *Humanity Immortal* (1872); *Logic of Reason* (1875). His philosophy is distinguished by the pre-eminence which it assigns to reason, placing it as far above and beyond the understanding in its comprehensiveness as the understanding is above sensual perception. Human reason has a consciousness of its own activity, and it also knows the absolute reason as its own necessary source. These fundamental principles Dr. Hickok applied in his successive works to the whole range of human thought.

See Vol. XI. p. 705 Am. ed. (p. 790 Edin. ed.).

HICKORY, a genus of valuable trees peculiar to North America, and belonging to the *Juglandaceæ* or Walnut family. There are in all 9 or 10 species included in the genus *Carya*. The hickories are distinguished by their large compound leaves, 5 to 15 in number of leaflets, but generally not more than 11. They bear male and female flowers; the former in compound catkins with 4 to 8 stamens; the latter solitary, or in small groups at the ends of the branches. The nut of the hickory is enveloped in a hard husk which splits into 4 regular valves. The nut has a smooth shell, though with 4 or more ridges running from end to end. Internally it is divided by partitions of the shell as in the walnut. These partitions are lacking in the Pecan nut, the most highly esteemed of the hickory nuts.

C. olivæformis, the Pecan nut hickory, is a large, showy tree, 60 to 70 feet high, and in exceptional cases much higher. Its locality is in the river bottoms of the Mississippi Valley, from Illinois southward. The nut is of an olive shape and delicious flavor. The wood is less valuable than that of some other species. The most esteemed of the eastern hickories is *C. alba*, the shell-bark or shag-bark. It is well marked by its shaggy bark which exfoliates in rough strips or plates. It is a large and handsome tree, furnishing most valuable wood. The leaf is divided into 5 leaflets. The nut is white, of flattish globular form, with a rather thin shell, and of sweet and delicious flavor. It is the principal hickory nut of the market. This species is found from Massachusetts to Nebraska and southward. *C. sulcata*, the western shell-bark, has 7 to 9 leaflets, and a small, oval, thick-shelled nut, with very thick husk and strongly pointed at each end. It ranges from Pennsylvania to Wisconsin and southward. Both these species form large trees, occasionally from 80 to 100 feet high and 3 feet diameter.

Of the remaining species may be named *C. amara*, the bitter nut or swamp hickory, a common species, with a thin-shelled but extremely bitter nut; *C. porcina*, the pig nut or broom hickory, also common, its nut thick-shelled and bitterish, its very tough fibres sometimes made into brooms; and *C. tomentosa*, the mocker nut, a tree with rough but not shaggy bark, extending from New England to Nebraska, with very thick and hard husk and very thick-shelled fruit. There are several other species, but those named are the most important.

The wood of the hickories is, as a rule, exceedingly valuable, it being generally heavy, hard, close-grained, and remarkably tough and elastic. As fuel they rank higher than any other of our native woods. They are confined to the region east of the Rocky Mountains, where they furnish timber of high industrial value. The wood of *C. alba* is of a brown color, the thin and more valuable sap-wood being nearly white. It is largely used for agricultural implements, carriages, axe-handles, baskets, etc. The wood of *C. sulcata*, *porcina*, and *tomentosa* is of the same character and used for the same purposes. *C. amara* furnishes material for hoops, ox-yokes, etc. *C. aquatica*, the swamp hickory of the South, yields timber suitable for fencing and fuel. *C. olivæformis* is used only for fuel. The wood of the hickory is subject to attacks of insects, and decays rapidly when exposed. (C. M.)

HICKS, EDWARD (d. 1883), a British soldier, known as Hicks-Pasha, entered the British service at an early age, and rose in India to the rank of colonel. About the beginning of 1883 the British government sent Col. Hicks as chief of staff to the Egyptian army in Soudan. He arrived at Khartoum, March 9, 1883, organized a force of 5000 men, then proceeded by steamboat to Gowo, where he brought together over 6000 Egyptians and formed a train of 6000 camels. On April 29 he was attacked by 45,000 Arabs, chiefly cavalry, and repulsed them. Leaving part of his troops on the White Nile, he returned to Khartoum, which had meanwhile been besieged. Then he formed in camp opposite Khartoum a new expedition, and in August was placed in command of all the Egyptian troops in the Soudan, amounting to 14,000 men. After fortifying several camps he had still 8000 men, well supplied with artillery, when about the middle of October he began his march towards El Obeid. At the same time El Mahdi, the Mohammedan prophet, had set out from the Soudan, but only with the intention of harassing the march of the Egyptians. On Nov. 1, near El Obeid, Hicks attacked the vanguard of the Soudanese host, and after a struggle, prolonged through four days, his army was annihilated, though the enemy had suffered a loss of 60,000 men. Hicks fell at the head of the Egyptian infantry, while leading a bayonet charge, on Nov. 4, 1883. This victory made El Mahdi master of the Soudan.

HICKS, GEORGE EDGAR, an English painter, was born at Lymington in 1824. He began to study medicine at the University of London, but turned his attention to art and entered the Royal Academy in 1844. In 1855 he exhibited at the Academy his Lark at Heaven's Gate, and in 1859 he established his reputation by his Dividend Day at the Bank. The success of this picture brought from him other paintings, showing power in depicting groups of varied character. But he also painted pathetic incidents with fewer figures. Among his works are Changing Homes (1862); The Return from the Gleaning (1876); Fisherman's Wife, Woodman's Daughter, Faith, Hope, and Charity.

HICKS-BEACH, Sir Michael Edward, an English statesman, was born at London, Oct. 23, 1837, the descendant of a long line of Gloucestershire baronets. He was educated at Eton and Christ Church, Oxford; graduated with honors in 1858; was chosen to Parliament in 1864 for East Gloucestershire, a constituency he has constantly represented since that time. In 1868 he was parliamentary secretary for the poor-law board, and for a time an under secretary for the home department. He was chief secretary for Ireland (1874–78) under Beaconsfield, and in that difficult position displayed great tact and capacity for business, and his moderation and skill even won the praise of the Home-Rule members. He was secretary of state for the colonies, 1878–80, and in 1885.

HIGGINSON, Thomas Wentworth, an American author, descended from Rev. Francis Higginson (1587–1630), was born at Cambridge, Mass., Dec. 22, 1823. He graduated at Harvard in 1841, studied theology at Cambridge, and was ordained pastor at Newburyport, Mass., in 1847. He took an active part in the anti-slavery movement, and in 1850 was a Free-Soil candidate for Congress. His congregation became dissatisfied and he resigned his charge. In 1852 he became minister of a free church at Worcester, Mass. In 1853 he led an attack on the Boston Court-house to rescue Anthony Burns, a fugitive slave then in custody of the U. S. marshal, and was wounded in the face. A man having been killed in the conflict, Higginson was afterwards indicted for murder, but escaped through a flaw in the indictment. He went to Kansas in 1856, and was conspicuous in the movement to make it a free State.. He then definitely retired from the ministry. On the outbreak of the civil war he recruited several companies of volunteers, and he was made captain in the Fifty-first Massachusetts regiment. In November, 1862, he became colonel of the First South Carolina volunteers (afterwards Thirty-third U. S. colored infantry), the first regiment of former slaves mustered into the service of the United States. With these troops he served in various expeditions in South Carolina and Florida, but being wounded in August, 1863, was compelled to retire in October, 1864. He afterwards resided at Newport, R. I., and engaged in literary pursuits. Returning to Cambridge, Mass., he was elected to the legislature for 1880–81, and has since been a member of the State Board of Education. He has delivered many lectures on historical and social topics, and has taken a prominent part in advocating woman suffrage and the higher education of both sexes. He has published *Out-Door Papers* (1863); *Harvard Memorial Biographies* (1866); *Malbone, an Oldport Romance* (1869); *Army Life in a Black Regiment* (1870); *Atlantic Essays* (1871); *Oldport Days* (1873); *Young Folks' History of the United States* (1875); *Young Folks' Book of American Explorers* (1878); *Short Studies of American Authors* (1880); *Common Sense about Women* (1881); *Margaret Fuller* (1884); *Larger History of the United States* (1884).

HIGH CHURCH. This is a phrase used to designate an adherence to church precedent and ecclesiastical authority. It is used as an adjective. Thus we say a high-church party or a high-church Christian. It has not so much relation to doctrine as to the outward church-life, yet it involves the doctrine of selected channels for the divine grace. High-church views are chiefly found in the prelatical churches, and yet the non-prelatical churches hold many who lay great stress on the efficacy of church order in service and sacraments, and who can be called advocates of high-church views. Low-church views emphasize the spiritual doctrines of the gospel, and make but little of ecclesiastical rules, beyond the decent order that avoids confusion. (H. CR.)

HILGARD, Eugene Waldemar, an American geologist, was born at Zweibrücken, Bavaria, Jan. 5, 1831. He is a son of Theodor Erasmus Hilgard (1790–1873), a German jurist, who removed with his family to the United States in 1835, but in 1850 returned to Germany. Eugene studied at the Academy of Mines, Freiberg, and at the Universities of Zürich and Heidelberg, graduating in 1853. He returned to the United States in 1855, and became assistant State geologist of Mississippi. In 1857 he had charge of the laboratory at the Smithsonian Institution at Washington, and from 1858 to 1873 he was State geologist of Mississippi, being also professor of chemistry in the University of Mississippi from 1866 to 1873. He was appointed professor of geology in the University of Michigan in 1873, and professor of agriculture in the University of California in 1875. He had charge of the statistics of cotton production for the census of 1880. He has also published reports on the geology and agriculture of Mississippi, and numerous articles in scientific journals.

HILGARD, Julius Erasmus, an American engineer, brother of the preceding, was born at Zweibrücken, Bavaria, Jan. 7, 1825. He received a classical education from his father, and studied civil engineering at Philadelphia. In 1845 he entered the service of the coast survey, with which he has since been connected, becoming in 1862 head of its office. In connection with this he has been engaged in the construction of standard weights and measures. In 1863 he was a member of the National Academy of Sciences. In 1872 he was a member of the international metric commission at Paris. In 1874 he was president of the American Association for the Advancement of Science.

HILL, Ambrose Powell (1825–1865), an American general, was born in Culpeper co., Va., in 1825. He graduated at West Point in 1847, and became second lieutenant of artillery. He served for a short time in the Mexican war, and afterwards on the frontier and in Florida. He was engaged in duty in the coast survey office from 1855 until the outbreak of the civil war, when he resigned. When Virginia seceded Hill was appointed colonel of a regiment, and he took part in the first battle of Bull Run. He was promoted to be brigadier-general, and for his services at Williamsburg he was made major-general. He was conspicuous during the seven days' fighting around Richmond in June, 1862. He was next attached to Gen. Jackson's force in Northern Virginia, and fought at Cedar Mountain, Second Bull Run, and Chantilly. Pushing on to the north he captured Harper's Ferry, and fought at Antietam. In December, 1862, he held the right of Jackson's force at Fredericksburg, and repulsed the attack of Meade. At Chancellorsville, in May, 1863, he took part in Jackson's daring march and unexpected assault on Howard's division. On the death of Jackson Hill succeeded to his command, but was soon disabled by a wound. He was then promoted to be lieutenant-general, and fought at Gettysburg in July. In the desperate conflicts of 1864 Hill displayed the same skill and gallantry as before. In 1865 he commanded the city of Petersburg during its siege, and on April 2, 1865, while reconnoitring, was killed by a rifle-shot.

HILL, Benjamin Harvey (1823–1882), an American statesman, was born in Jasper co., Ga., Sept. 14, 1823. He graduated at the University of Georgia in 1844, and was admitted to the bar at La Grange, Ga., in 1845. He was successful in his profession, and in 1851 was elected to the State legislature. After the dissolution of the Whig party he was a favorite candidate with the American party, but was not elected either to Congress or to the governorship for which he had been nominated. In 1859, when secession was agitated, he was elected to the State senate as a Union man. In January, 1861, in the State convention he earnestly advocated remaining in the Union, but afterwards voted for the ordinance of secession. He was elected to the provisional Confederate Congress which met at Montgomery, Feb. 4, 1861, and afterwards to the Confederate Senate at Richmond, where he remained till the close of the war. In May, 1865, he was arrested at his home at La Grange, Ga., and confined for six weeks at Fort Lafayette, New York, being then released on parole. In 1867 he assisted in reorganizing the Democratic party in Georgia, and opposed the Reconstruction measures of Congress. In 1870 he advocated hearty acceptance by the Southern people of the issues of the war, and in 1872 warmly supported Horace Greeley as the Democratic candidate. In January, 1873, he was unsuccessful in his candidacy for the U. S. Senatorship. In 1875 he was elected to Congress, and was re-elected, but resigned on being chosen U. S. Senator in 1877. He died at Atlanta, Aug. 16, 1882.

HILL, Daniel Harvey, an American general, was born in South Carolina in 1821. He graduated at West Point in 1842 and entered the artillery, but in 1847 was made first-lieutenant of infantry. He served throughout the Mexican war and by his gallantry attained the brevet rank of major. Resigning his commission in 1849 he was professor of mathematics in Washington College, Va., in 1849–54, then in Davidson College, N. C., until 1859, when he was made president of the Military Institute at Charlotte. On the outbreak of the civil war he was made colonel of the First N. C. volunteers, and he was engaged in the fight at Big Bethel, Va., June, 1861. He was soon raised to the rank of major-general and commanded a division during the Seven Days' fight around Richmond in June, 1862. He fought afterwards at South Mountain, Antietam, Fredericksburg, and in 1863 was sent to command in North and South Carolina. He fought at Chickamauga in September, 1863, and was afterwards recalled to Virginia, but at the surrender of the Confederate armies his division was with Gen. J. E. Johnston. After the war Gen. Hill returned to Charlotte, N. C., where he published a monthly magazine, *Field and Farm*, and subsequently *The Land We Love* (1867–69). He was a brother-in-law of Stonewall Jackson, and like him a man of strong religious principle, and an able general. He has published *Elements of Algebra*, *Consideration of The Sermon on the Mount*, and *The Crucifixion of Christ*.

HILL, Thomas, an American clergyman and educator, was born at New Brunswick, N. J., Jan. 7, 1818. He graduated at Harvard College in 1843, studied theology, and was ordained pastor at Waltham, Mass., in 1845. He succeeded Horace Mann as president of Antioch College in 1859. In 1862 he was called to be president of Harvard College, but he resigned in 1868 on account of ill health. In 1871 he was botanist in the Hassler expedition around the coasts of South America under Prof. Agassiz. In 1872 he became pastor of a church at Portland, Me. He is well versed in the natural sciences and is especially fond of mathematics, in the methods of which he has made some improvements. He also aims to make all science tributary to religion. He has published besides some elementary mathematical books: *Geometry and Faith* (1849; 2d ed., 1874); *Liberal Education* (1855); *True Order of Studies*, *Jesus the Interpreter of Nature* (1859); *Natural Sources of Theology* (1875).

HILLIARD, Henry Washington, an American statesman, was born in Cumberland co., N. C., Aug. 8, 1808. He graduated at South Carolina College in 1826, was admitted to the bar at Athens, Ga., in 1829, and was appointed professor in the State University of Alabama in 1831; but in 1834 resumed the practice of his profession at Montgomery, Ala. He was elected to the State legislature in 1838 as a Whig. In 1842 he was sent by Pres. Tyler as minister to Belgium. From 1845 to 1851 he was a member of Congress, when he supported Clay's compromise of 1850. After being an earnest advocate of the Union cause he cast in his lot with the Confederacy. He was sent as commissioner to Tennessee to secure the secession of that State. He held nominal rank as a brigadier-general in the Confederate army. At the close of the war he resumed the practice of law at Augusta, Ga., and afterwards at Atlanta. He was U. S. minister to Brazil from 1877 to 1880. He published a volume of *Speeches* (1855), and a novel, *De Vane*.

HINCKS, Edward (1792–1866), an Irish clergyman and Assyriologist, was born at Cork, in August, 1792. He was the son of Rev. T. D. Hincks, LL.D., professor of Oriental languages in the Belfast Academical Institution, and inherited a fondness for the study of languages. He graduated at Trinity College, Dublin, and received a fellowship. He took orders in the Established Church of Ireland and became rector of Ardtrea, and in 1826 of Killyleagh. Though having but little means to procure books he took great interest in the study of Egyptian and Assyrian archæology and laid the foundation of Assyrian grammar. He also discovered the key to the Assyrian numeral system. He died at Killyleagh, Dec. 3, 1866.

HINCKS, Sir Francis, a Canadian statesman, brother of the preceding, was born at Cork, Ireland, in 1805. He was educated at Fermoy and Belfast, and became a merchant. In 1832 he settled at Toronto, when he entered into politics and edited the *Examiner* with great vigor. In 1841 he was elected to the Dominion Parliament and was soon after appointed inspector-general. He was a prominent advocate of "responsible government," and by persistent effort obtained the recognition of this principle in the administration of Canadian affairs. In 1851 he was made prime minister of Canada and held this post until 1854. In 1855 he was appointed governor and commander-in-chief of the Windward Islands, and from 1860 to 1866 he was governor of British Guiana. He then returned to Canada and took part in the union of the British provinces in the Dominion of Canada. He received the honor of knighthood in 1869, and from that time until 1873 he was the finance minister of Canada. In 1878 he was one of the commissioners to settle the northern and western boundary of Ontario.

HIND, John Russell, an English astronomer, was born at Nottingham, May 12, 1823. From an early age he was devoted to the study of the stars, and when sixteen years old contributed astronomical notes to a local paper. He was sent to London in 1840 as an assistant to a civil-engineer, but through the influence of Prof. Wheatstone he was soon employed in the royal observatory. Nearly four years later his talents caused Prof. G. B. Airy to recommend him for the position of observer in Mr. G. Bishop's observatory, at Regent's Park. From the series of observations which he conducted here, Hind calculated the orbits and declinations of 70 planets and comets; he also noted 16 movable stars and 3 nebulæ, and discovered 10 asteroids. The dates of the latter extend from Aug. 13, 1847, when Iris was discovered, to July 22, 1854, when Urania was discovered. In December, 1844, Mr. Hind was elected a member of the Royal Astronomical Society, and in 1847 he was appointed its foreign secretary. In 1852 the British government bestowed on him a pension of £200, and many marks of honor have been bestowed on him by foreign governments and societies. He is the superintendent of the British Nautical Almanac, which, under his direction, has become of the highest authority for astronomical as well as for nautical use. He has published *The Solar System* (1846); *Illustrated London Astronomy* (1853); *Elements of Algebra* (1855); *Descriptive Treatise on Comets* (1857).

HINDMAN, Thomas C. (1818–1868), an American general, was born in Tennessee in 1818. He served in the Mexican war as second-lieutenant of Mississippi volunteers. Elected to Congress from Arkansas in 1859, he served until secession began, being also a member of the Democratic Convention at Charleston, S. C., in 1860. On the outbreak of the civil war he was made a brigadier-general in the Confederate army, and served under Gen. S. B. Buckner in Kentucky, and afterwards had command at Memphis. He was engaged at the battle of Shiloh, and was commissioned as major-general. He was then transferred to Arkansas, where he had the chief command. He commanded a division in Gen. Polk's army at Chickamauga. After the close of the war he went to Mexico, but returned in 1867 to Helena, Ark., where he was killed by one of his former soldiers, Sept. 27, 1868.

HINSDALE, Burke Aaron, an American educator and author, was born at Wadsworth, Ohio, March 31, 1837. He was educated at the Elective Institute, and became a minister of the Christian (or Campbellite) Church in 1861. He was pastor of a church at Solon, 1864–66, and at Cleveland, 1866–68. He was then appointed professor of history and English literature in Hiram College, and became its president in 1870. He was assistant editor of the *Christian Standard* from 1866 to 1869, and has since been assistant editor of the *Christian Quarterly*, Cincinnati. He has published *Genuineness and Authenticity of the Gospels* (1873); *Evolution of the Theological and Doctrinal Systems of the Ancient Church* (1876); *Life of President Garfield* (1882); *Schools and Studies* (1884). He has edited Pres. Garfield's *Works* (1883).

HITCHCOCK, Ethan Allen (1798–1870), an American general and author, was born at Vergennes, Vt., May 18, 1798. He was a son of Judge Samuel Hitchcock and a grandson of Col. Ethan Allen. He graduated at West Point in 1817, and was assistant instructor in tactics there in 1824, and from 1829 to 1833 was commandant of cadets. He volunteered his services in the Florida war, and was inspector-general in Gaines' campaign in 1836. He was afterwards employed on the frontier, and in the Mexican war he was inspector-general under Scott, receiving the brevet of brigadier-general. He then made a tour in Europe and the East, and in 1851, having attained the rank of colonel, was placed in command on the Pacific coast. In October, 1855, he resigned his commission because Jefferson Davis, then secretary of war, refused to confirm a leave of absence which Gen. Scott had granted. Gen. Hitchcock afterwards resided in St. Louis, and engaged in philosophical and literary pursuits. When the civil war broke out he offered his services to the government, and was appointed major-general of volunteers, Feb. 10, 1862. He was placed on duty in the war department, and was afterwards commissioner for the exchange of prisoners, and commissary-general of prisoners. He retired from service in October, 1867, and died at Sparta, Ga., Aug. 5, 1870. Among his published works are *The Doctrines of Swedenborg and Spinoza Identified* (1846); *Alchemy and the Alchemists* (1857); *Swedenborg a Hermetic Philosopher* (1858); *Christ the Spirit* (1861); *Remarks on the Sonnets of Shakespeare, Colin Clout Explained* (1865); *Remarks on the Vita Nuova of Dante* (1866).

HITCHCOCK, Roswell Dwight, an American theologian, was born at East Machias, Maine, Aug. 15, 1817. He graduated at Amherst in 1836, and studied theology at Andover. He was tutor at Amherst from 1839 to 1842, and then resident licentiate at Andover until 1844, when he went to Waterville, Maine. He was ordained pastor of the First Congregational Church, Exeter, N. H., Nov. 19, 1845, and held this office until 1852, though spending a year in Germany at the Universities of Halle and Berlin. In 1852 he was appointed professor of natural and revealed religion at Bowdoin College. In 1855 he was made professor of church history in Union Theological Seminary, New York, and in 1880 president of that seminary. During the civil war he earnestly advocated the cause of the Union. In 1866 he visited Italy and Greece, and in 1869–70 Egypt and Palestine. He then assisted in organizing the Palestine Exploration Society, and in 1871 was elected its president. In 1885 he again went abroad. He was a frequent contributor to the *Presbyterian Quarterly*, and from 1863 to 1870 was one of the editors of the *American Theological Review*. Besides numerous addresses and sermons he has published a *Complete Analysis of the Bible* (1869), and has edited *Life and Writings of Edward Robinson* (1864). In 1855 he received the degree of D. D. from Bowdoin College, and in 1873 of LL. D. from Williams College.

HOAR, Ebenezer Rockwood, an American jurist, was born at Concord, Mass., Feb. 21, 1816, being a son of Judge Samuel Hoar (1778–1856). He graduated at Harvard College in 1835, studied law at Cambridge, and was admitted to the bar in 1840. He was appointed judge of the court of common pleas in 1849, but resigned in 1855, and resumed practice in Boston. He was appointed a judge of the Supreme Court of Massachusetts, and held this office until 1869, when Pres. Grant appointed him U. S. attorney-general. This office was then constituted the department of justice. In 1870 Judge Hoar was nominated a justice of the Supreme Court of the United States, but was not confirmed. He was a member of the Joint High Commission which negotiated the treaty of Washington in 1871. He was a member of Congress from Massachusetts from 1873 to 1875. He is noted for his fine culture, wit, and social qualities, as well as his professional attainments.

HOAR, George Frisbie, an American statesman, brother of the preceding, was born at Concord, Mass., Aug. 29, 1826. He graduated at Harvard College in 1846, studied law at Cambridge, and was admitted to the bar in 1849. He settled at Worcester, Mass., and became a member of the legislature in 1852, and of the State senate in 1857. He took a prominent part in organizing the Republican party in Massachusetts. He was elected to Congress in 1868, and served four terms. He was a member of the Electoral Commission of 1877, since which time he has been U. S. Senator. He has been a delegate to each Republican National Convention since 1876, and presided over the Convention of 1880. He is the author of *Memoir of Samuel Hoar, Memoir of A. H. Bullock*, and has published many speeches and addresses.

HOAR, Samuel (1778–1856), an American statesman, was born at Lincoln, Mass., May 18, 1778. His father, Samuel, was a captain in the Revolutionary army, and served many years in the State legislature. The son graduated at Harvard in 1802, and was admitted to the bar in 1805. He became eminent in his profession, and in 1820 was a member of the State Constitutional Convention. He was a State senator in 1825 and 1833, a member of Congress in 1835–37, and a State councillor in 1845–46. In 1844 he was sent by the State of Massachusetts to South Carolina to test the constitutionality of acts of the latter State, by which free negro sailors were seized and imprisoned on entering its ports. On Dec. 5, 1844, he was driven from Charleston by a mob, and the State legislature on the same day authorized the governor to expel him. Mr. Hoar was active in religious and charitable work. He died at Concord, Mass., Nov. 2, 1856.

HOBART, Augustus Charles, known as Hobart Pasha, a Turkish admiral, was born in England, April 1, 1822, being the third son of the Earl of Buckinghamshire. He entered the British navy in 1836, and while a midshipman gained distinction by his zeal in the suppression of the Brazilian slave-trade. In 1845–46 he served in the queen's yacht. He had command of the Driver in the Baltic Sea in 1854, and was commended for gallantry. He then retired on half-pay, and during the American civil war he commanded the Don, a blockade-runner. An account of his experiences appeared under the name of Captain Roberts. He became a post-captain in 1862, and in 1867 he offered his services to the Turkish government. He was employed to stop the Greek blockade-runners at Crete during the Cretan insurrection. His great success in this service and in negotiations caused him to be made pasha and admiral. The Greek minister, however, had complained to the British government of his conduct, and his name was struck off the navy list. In 1874 he appealed to Lord Derby for reinstatement, acknowledged his breach of discipline in accepting service under the Turkish government without leave, but pleaded in extenuation his services in organizing and strengthening the navy of an ally, establishing training schools, maintaining the reputation of England, and preventing bloodshed and a general war. His request was granted on the ground of "imperial policy." At the outbreak of the Russo-Turkish war, in 1877, he was placed in command of the Black Sea fleet of Turkey, and his name was again removed from the British navy list. Hobart Pasha sailed down the Danube under a heavy fire from the Russians, but during most of the war his fleet lay at anchor, being prevented from action by the Russian torpedoes. He is now inspector-general of the Turkish navy.

HOBART, John Henry (1775–1830), an American bishop, was born at Philadelphia, Sept. 14, 1775. He graduated at Princeton College in 1793, and was tutor there from 1796 to 1798. In the meantime he studied theology, and was ordained deacon in June, 1798, and priest in 1801, being the assistant minister of Trinity Church, New York. Here he became assistant rector in 1812 and rector in 1816. Before 1800 he had been secretary of the House of Bishops, and was deputy to the General Convention of 1801, and secretary of the lower House in 1804 and 1808. He was chosen assistant bishop of New York in February, 1811, and bishop in 1816. He was one of the founders of the General Theological Seminary in New York, and in 1821 became professor of pastoral theology and pulpit eloquence in it. In 1823 he visited Europe, and while in England published two volumes of sermons (1824). He denied the validity of any but episcopal orders, and opposed the formation of Bible and tract societies composed of Christians of different denominations. He died at Auburn, N. Y., Sept. 10, 1830. He published *Companion for the Altar* (1804; 13th ed., 1840); *Apology for Apostolic Order* (1807); *State of the Departed* (1816; new ed., 1843). His posthumous works with a memoir were edited by Rev. W. Berrian, D. D. (1833). Other memoirs were published by Schroeder (1833) and McVickar (1834–36).

HOBOKEN, a city of New Jersey, in Hudson county, is immediately adjacent to Jersey City on the north. Being on the Hudson River opposite New York, it is one of the suburbs of the metropolis. To the westward a steep rocky escarpment separates it from West Hoboken. It is the seat of a large shipping trade, especially in coal, and is the place whence several lines of European steamers start. The Delaware, Lackawanna, and Western Railroad has its eastern terminus at this place. Lead-pencils and iron-castings are among the leading articles manufactured. The most noteworthy public institution is the Stevens Institute of Technology, which ranks among the principal schools of its class in the United States. Hoboken is well provided with churches, schools, newspapers, and street railways, and has several banks; but its business interests are in the main subsidiary to those of New York. Population in 1870, 20,297; in 1880, 30,999.

HODGE, Archibald Alexander, an American theologian, son of Rev. Charles Hodge, D. D. (for whom see Encyclopædia Britannica), was born at Princeton, N. J., July 18, 1823. He graduated at Princeton College in 1841, was tutor there from 1844 to 1846, and graduated at Princeton Theological Seminary in 1847. He went as a missionary to Allahabad, India, but returned in 1850 on account of his wife's impaired health. He was pastor of a Presbyterian church at Lower West Nottingham, Md., from 1851 to 1855, then at Fredericksburg, Va., until 1861, and afterwards at Wilkes-Barre, Pa., for a year. In 1864 he was chosen by the Presbyterian General Assembly to the chair of didactic, historical, and polemic theology in the Western Theological Seminary, Allegheny, Pa. In 1866 he became also pastor of the North Presbyterian Church of that city. In 1872 he was called to Princeton Theological Seminary to be assistant to his father, and after the latter's death, in 1878, succeeded him as professor of dogmatic theology, while his brother, Rev. Charles W. Hodge, became professor of exegetical theology. He has published *Outlines of Theology* (1860); *The Atonement* (1867); *Commentary on the Confession of Faith* (1869); *Presbyterian Doctrine briefly Stated* (1869); *Life of Charles Hodge* (1880); *Manual of Forms* (1883).

HODGE, Hugh Lenox (1796–1873), an American physician, was born at Philadelphia, June 27, 1796, being brother of the theologian, Rev. Charles Hodge, D. D., and son of Dr. Hugh Hodge, an eminent physician. He graduated at Princeton in 1814, studied medicine at the University of Pennsylvania, taking his degree in 1817. He acquired an extensive practice, and in 1835 was made professor of obstetrics in the University of Pennsylvania. After a service of twenty-eight years he became professor emeritus in 1863. He died at Philadelphia, Feb. 23, 1873. He published *System of Obstetrics* and *Diseases Peculiar to Women*, both of which passed through several editions. He also contributed frequently to professional journals. His son, Hugh Lenox Hodge (1833–1882), was a noted surgeon.

HOFFMAN, Charles Fenno (1806–1884), an American author, was born at New York city in 1806. He was the son of Judge J. Ogden Hoffman. When he was eleven years old his leg was crushed between a steamboat and a wharf on which he was sitting, and had to be amputated above the knee. He attended Columbia College for two years, and was admitted to the bar in 1827. He then became associate editor of the *New York American*, and in 1833 was the first editor of the *Knickerbocker Magazine*. A trip to the prairies furnished the material for *A Winter in the West* (1834), and *Wild Scenes in the Forest and the Prairie* (1837), and also for his novel, *Greyslaer* (1840). His poems, which had been widely circulated, were first collected in a volume called *The Vigil of Faith, and other Poems* (1842). A second volume appeared in 1844, under the title *Borrowed Notes for Home Circulation* (1844). In 1849 he was unfortunately attacked by a mental disorder, which closed his literary career. He died at Harrisburg in 1884. His *Poems* were edited with notes by his nephew, Edward Fenno Hoffman, in 1873.

HOFFMAN, David (1784–1854), an American jurist, was born at Baltimore, Dec. 25, 1784. He became an eminent lawyer, and in 1817, being chosen professor of law in the University of Maryland, published a *Course of Legal Study*, which has been approved by the highest authorities. In 1836 he resigned his professorship, and spent two years in Europe. He then practised law in Philadelphia until 1847, when he made another visit to Europe. He returned in 1853, and died suddenly at New York, Nov. 11, 1854. He had received the degree of LL. D. from the University of Maryland, and from the University of Oxford, England, and that of J. U. D. from the University of Göttingen. His publications were *Legal Outlines* (1836); *Thoughts on Men, Manners, and Things, by Anthony Grumbler* (1837); *Viator, or A Peep in My Note-book* (1840); *Legal Hints* (1846), which included his *Course of Legal Study;* and *Chronicles Selected from the Originals of Cartaphilus, the Wandering Jew* (2 vols., 1853–55). The last was intended to be a summary of modern history, and to comprise six volumes, but only two were published.

HOFFMANN, Ludwig Friedrich Wilhelm (1806–1873), a German clergyman, was born at Leonberg, Würtemberg, Oct. 30, 1806. He studied theology at Tübingen, became in 1830 vicar at Heumaden, and in 1833 at Stuttgart. In 1834 he was pastor at Wienenden, and in 1839 was made director of the Missionary Institute at Basle. Here he labored with great zeal, and was also for some years professor of theology at the Basle University. In 1850 he was recalled as professor to Tübingen, and in 1852 he was made court-preacher at Berlin by King Frederick William IV. Over the king Hoffmann had great influence, and he used it to promote ecclesiastical union between the two great Protestant churches. He also labored earnestly to unite all Germany. He died at Berlin, Aug. 28, 1873. His writings include *Missionsstunden und Vorträge* (1847–53); *Epochen der Kirchengeschichte Indiens* (1853); *Franz Xavier* (1869); *Ruf zum Herrn* (1854–58); *Die Haustafel* (1859–63); *Ein Jahr der Gnade* (1864).

HOFMANN, August Wilhelm, a German chemist, was born at Giessen, April 8, 1818. He studied philology and law, and graduated Ph. D. in 1842, but then devoted himself to chemistry, as assistant to Liebig. In 1845 he was made professor of chemistry at Bonn, and in 1848 he was called to the newly founded Royal College of Chemistry at London. He did much to promote the study of his favorite science, and a chemical class which he instructed was in 1853 included in the Royal School of Mines. In 1855 he was also made assayer at the Mint. In 1864 he was called to Bonn as professor of chemistry, and proceeded to organize an excellent laboratory, but before he could use it he was called to Berlin, where another well-equipped laboratory was erected under his supervision. He has devoted special attention to the investigation of ammonium compounds, and of aniline colors. His researches have had great influence upon industrial as well as analytical chemistry. His publications include *Hand-book of Organic Analysis* (1853); *Einleitung in die Moderne Chemie* (6th ed., 1877). Since the death of Liebig, Hofmann has edited the *Annalen der Chemie*. In the controversy about University studies in 1881 Hofmann took the classical side.

HOLBROOK, John Edwards (1794–1871), an American naturalist, was born at Beaufort, S. C., Dec. 31, 1794. He was taken to Massachusetts while an infant by his parents. He graduated at Brown University in 1815, and after receiving the degree of M. D. from the University of Pennsylvania went to Europe, where he continued his professional studies. While at Paris he resided at the *Jardin des Plantes*. In 1822 he settled at Charleston, S. C., and in 1824 he was made professor of anatomy in the Medical College of South Carolina, which position he held for more than thirty years. His most important work is *American Herpetology, or a Description of the Reptiles of the United States* (5 vols., 1842). He began a work on *Southern Ichthyology*, but finding the field too extensive he confined himself to the *Ichthyology of South Carolina*, of which 10 numbers had been issued before the civil war. He was compelled to serve as surgeon in a South Carolina regiment, though while professor he had refrained from performing any surgical operations. He died at Norfolk, Mass., Sept. 8, 1871.

HOLDER, Joseph Bassett, an American naturalist, was born at Lynn, Mass., Oct. 26, 1824. He was educated at Friends' College, Providence, R. I., and studied medicine. Entering the U. S. service, he was acting-post-surgeon at Fort Jefferson, Florida, in 1858–59, and surgeon, 1860–65; assistant-post-surgeon at Fortress Monroe, Va., 1866–70. He then resigned, and joined Prof. A. S. Bickmore in establishing the American Museum of Natural History in New York. He is a member of several scientific societies. He has published *History of American Fauna* (1878); *History of the Atlantic Right Whales* (1883), and many papers on natural history.

See Vol. XII. p. 61 Am. ed. (p. 59 Edin. ed.).

HOLLAND, a minor country of Europe, which formerly occupied a prominent position in European politics, but has now greatly declined in importance. We shall here deal with it only in its most recent aspects.

This country, with one or two small outlying provinces, constitutes the kingdom of the Netherlands, a limited monarchy, now under King William III., who was born Feb. 19, 1817, and succeeded William II. on March 17, 1849. The area of the Netherlands is 12,648 square miles, with a population, in 1883, of 4,225,065. The religious sects, under the census of 1879, comprised 2,469,814 Protestants, 1,439,137 Catholics, 81,693 Jews, and 22,049 of other beliefs. The principal cities are Amsterdam with 361,326 inhabitants, Rotterdam with 166,002, and the Hague with 131,447, on Jan. 1, 1884. The commerce of Holland in 1882, including its colonial commerce, amounted to $396,843,000 imports and $300,824,000 exports. The total revenue, as per the budget of 1884, amounted to $45,666,410, with an expenditure of $57,432,300. The deficiency thus caused the government is empowered to meet provisionally by the issue of treasury bills, while some recent expedients have been adopted to increase the revenue. Of this expenditure about $13,000,000 is on account of the public debt, which amounts to $401,701,000, most of which is funded at 2½ per cent. interest. The colonial provinces of Holland have a surface extent of 659,126 square miles, with a population of about 28,333,000. The principal part is in the island of Java. The remaining colonies embrace the greater part of Sumatra and other islands in the Malaysian archipelago, several places in New Guinea and Dutch Guiana and the Dutch Antilles in America. The colonial budget for 1885 estimates the expenditure at $57,200,000, which exceeds the estimated receipts by $500,000. The principal exports from these colonies are coffee, sugar, indigo, cloves, nutmegs, rice, tobacco, tea, gutta-percha, pepper, tin, etc. The principal imports are cotton cloth, petroleum, beer, wine, liquors, butter, flour, iron wares, glass, crockery, paper, etc. The government of Java has been until recently administered under a species of serfdom, known as the "culture system." This was abolished in 1882 in respect to the cultivation of indigo, pepper, tobacco, tea, etc., but retained in respect to sugar and coffee. The forced labor in sugar cultivation is to end in 1890. Nearly all the soil is claimed as government property, and forced labor for the government without pay may be exacted one day out of seven. The natives in the coffee districts must plant a certain number of coffee plants annually and sell the product to the government at the rate of 14 guilders ($5.60) per pecul of 133 pounds. In January, 1884, Otto Van Rees was appointed governor-general of the East India colonies, in pursuance of the liberal colonial policy, under which the natives in the coffee districts are given the option to continue to hold their lands in common, as now, or to be given them as individual property.

The total tonnage of sailing vessels entered in Holland for 1883 was 2,246,927 cubic meters, of which 797,000 was under the Dutch flag. Steam-tonnage entered, 8,750,949; under Dutch flag, 2,417,435. The railroad mileage on Jan. 1, 1884, was about 1250 miles, of which more than half belonged to the state. The length of colonial railroads was about 400 miles. The state telegraph lines on Jan. 1, 1884, were 2642 miles in length. The telegraphic despatches in 1883 numbered 3,347,093. The number of letters sent by the postal service was 47,162,360 domestic and 14,232,332 international; postal cards, 20,235,882; journals, 45,773,598. The navy of the Netherlands in 1884 comprised 23 iron-clads of varied sizes, 93 steamers, 14 school-ships, and 10 other vessels. These were manned by 6821 men, together with 2361 marines and 1119 sailors in the East Indies. The standing army in 1883 comprised 2325 officers and 62,689 men, the active militia 37,198, the sedentary militia 77,103. The army of the East Indies was composed of 1352 officers and 29,000 men, more than half of whom were natives. A new army law was proposed in 1882, reorganizing the military system. Under this the active militia, composed of drafted men and volunteers, is to be raised to a maximum strength of 62,400, the annual recruits being 12,600. The national guard, or reserve force, will include all capable males between the ages of 20 and 30. The strength of the reserve in peace is estimated at 142,000, and the force trained and ready for service at any time at 81,000.

Historical.—In 1873 a war broke out between Holland and the province of Acheen in Sumatra, which has continued until the present time. The unpleasant relations of Acheen with European states have existed for a long time. In 1824 Holland was forced by England to assent to a guarantee of independence to the Sultan of Acheen. England withdrew this guarantee in 1871, in consequence of the insults to foreign flags by the fanatical sultan. An effort was made to form a treaty with Acheen, but, as it became evident that the sultan was negotiating with the Italian and United States consuls, the authorities of Java, fearing foreign intervention, declared war against Acheen on March 26, 1873. The first expedition proved an entire failure. The commander-in-chief was killed, and his troops had great difficulty in re-embarking. A second expedition landed about Dec. 11, 1873, and quickly captured the Kraton, the fortress and capital of the sultan, who shortly afterwards died of cholera. Many of the coast rajahs submitted, and the governor-general decided to annex Acheen as the best policy, since a treaty would be useless. This annexation has been bitterly resisted. In 1877, after a feeble protraction of the war, Gen. Van der Heyden took command, and in two brilliant campaigns brought the war to a temporary close. He remained in control of the country as a kind of military dictator. But despite the efficiency of his administration a home pressure was brought against this dictatorial rule, and he was removed in 1881, and succeeded by a new civil administration. Immediately a revolt broke out, and the Acheenese still continue defiant, though recently the Dutch military operations have been more energetic. The trouble was complicated in 1883 by the capture of the crew of a wrecked English merchant ship called the Nisero, by the Acheenese rajah of Lenom. He tried every means to embroil Holland and England, and though his country was ravaged by an army he held his captives for a year, and only released them on payment of an indemnity of 100,000 guilders ($40,000). Only 20 of them still lived, the others having died of starvation and other privations. The war with Acheen has cost more than $120,000,000, and the lives of over 60,000 Dutch soldiers—mainly through sickness. The population of Great Acheen, of 300,000 or 400,000, had been reduced in 1880 to 50,000.

The most important home question in Holland is that of the succession to the throne. The recent death of the Prince of Orange has left the royal line without male descendants. The Princess Wilhelmina, the only surviving child of the king, born in 1880, will succeed her father, while the Duchy of Luxemburg will go to the deposed Duke of Nassau. The prospect of a long regency caused the Chambers, in December, 1883, to adopt a bill to modify the constitution in such a manner as to remove the restriction which forbade a revision of the constitution during a regency. Other important measures were adopted, and efforts made to extend the franchise. At present the election laws give the franchise to only a select portion of the people, and only a fraction of these vote, so that there are usually not more than 25,000 votes polled in the whole country. In the elections to the Second Chamber, which took place in November, 1884, the Liberal majority was greatly reduced. This caused an abandonment of the scheme of constitutional revision until this majority can be restored. In July a syndicate was given the task of raising a new 4 per cent. loan of 60,000,000 guilders to cover past deficiencies. There was also a bill passed to reorganize the state lottery, so as to increase the revenue now derived from this source 125,000 guilders. Other important late events in Holland are the abolition of the death-penalty in 1870, the opening of the great Amsterdam ship-canal in 1876, and the preliminary measures toward the project of draining the Zuyder Zee. If this should be accomplished it would add an area of 650 square miles to the country. The draining of the Harlem Lake, from 1840 to 1853, added 70 square miles of highly fertile land, now thickly populated.

HOLLAND, JOSIAH GILBERT (1819–1881), an American journalist, editor, and author, was born at Belchertown, Mass., July 24, 1819. He graduated at Berkshire Medical College, Pittsfield, Mass., and after some practice as a physician went to Vicksburg, Miss., where he was superintendent of public schools for a year. In May, 1849, he became associate editor of the *Springfield Republican*, to the success of which he contributed much. In 1855 Dr. Holland published a *History of Western Massachusetts*, and in 1857 *The Bay-Path*, a tale giving some romantic aspects of life in a Puritan community. *Bitter Sweet* (1857), his first poem, was a more ambitious attempt to combine romance with modern New England life. *Miss Gilbert's Career* (1860), a realistic novel, gave the author scope for his propensity to point a moral. This ingrained moralizing tendency marks all his writings, and has probably contributed to their success. *Timothy Titcomb's Letters to Young People* (1858), *Gold Foil Hammered from Popular Proverbs* (1859), *Letters to the Joneses* (1863), and other books of the same kind, are ingenious essays in giving youth the results of experience, without the trouble or danger of going through it for themselves. Dr. Holland's aim was to be a moral instructor to American people, especially to American youth; and, trained in the school of journalism to get the attention of his readers, he succeeded admirably in his purpose. With a moderate talent for humor, he maintained in general a cheerful gravity, as became a teacher of the people. His teaching was not confined to his books; he was also in demand as a popular lecturer. In 1860 he retired from the *Springfield Republican*, and until 1870 his literary work was confined to his books, though he spent two years in travelling in Europe. Then with mind enriched by observation abroad, he returned to become editor-in-chief of *Scribner's Monthly*, a new magazine, which proved a success from the start. In it he published another novel, *Arthur Bonnicastle* (1874), showing the training of an American boy to genuine manhood. Dr. Holland published a complete edition of his poems, under the title *Garnered Sheaves* (1873). Still later he published *The Mistress of the Manse* (1874). He died Oct. 12, 1881.

HOLMES, ABIEL (1763–1837), an American clergyman, was born at Woodstock, Conn., Dec. 24, 1763. He was a son of Dr. David Holmes, who served as a captain in the French and in the Revolutionary war. Abiel graduated at Yale College in 1783, and was tutor there in 1786–87. He had in the meantime studied theology, and in 1788 was ordained pastor of a congregation at Midway, Ga. In 1790 he married Mary, daughter of Rev. Dr. Ezra Stiles, president of Yale College. Being obliged to return to the North on account of his health he became in 1792 pastor of the First Congregational Church at Cambridge, Mass. In 1832 the congregation divided on account of the Unitarian controversy, and Dr. Holmes remained pastor of the orthodox portion, being assisted in his duties by a colleague. He died at Cambridge, June 4, 1837. His first wife had died in 1795, and in 1800 he married Sarah, daughter of the Hon. Oliver Wendell, of Boston. Dr. Holmes wrote the *Life of President Stiles* (1796); and he afterwards devoted much time to historical and antiquarian research. He published *American Annals* (2 vols., 1805; 2d ed., 1829), which gained high commendation for its accuracy. He also published sermons, and contributed to the *Massachusetts Historical Collections* a *Memoir of the French Protestants*, and a *History of Cambridge*.

HOLMES, George Frederick, an American educator, was born in Georgetown, Demerara, Guiana, Aug. 21, 1820. He was early sent to England, and was educated at the University of Durham. He removed to the United States in 1838, and taught in classical schools in Virginia, Georgia, and South Carolina. In 1842, although not naturalized, he was licensed by special act of the South Carolina legislature to practice law. In 1845 he was appointed professor of ancient languages in Richmond College, Va., and in 1847 professor of history, political economy, and international law in William and Mary College. In 1857 he became professor of history and literature in the University of Virginia, and since 1882 has been professor of historical science in the same institution. He has contributed articles to the *North British Review*, and many other periodicals, has prepared a series of text-books for schools in the Southern States, and a *New History of the United States*.

HOLMES, Oliver Wendell, an American author, was born at Cambridge, Mass., Aug. 29, 1809, being the son of Rev. Dr. Abiel Holmes (*q. v.*). He was educated at Phillips Academy, Exeter, and at Harvard College. Graduating at the latter in 1829 he began to study law, but soon turned to medicine. In 1832 he went to Europe, and pursued professional studies for nearly three years in Paris and other cities. In 1836 he obtained the degree of M. D., and in 1838 was elected professor of anatomy and physiology in Dartmouth College. In 1840 he established himself as a practitioner in Boston, and in 1847 he was made Parkman professor of anatomy and physiology in the medical school of Harvard College.

While still an undergraduate Holmes had displayed a knack for humorous poetry, and in 1830, with a few kindred spirits, prepared the sparkling paper called *The Collegian*. Six numbers only were issued, but out of the twenty-five pieces which Holmes supplied five or six have been thought worthy of a place in his latest collections. In 1836, after his return from Europe, he delivered his metrical essay on *Poetry* before the Phi Beta Kappa Society, and on numerous similar occasions since that time he has presented appropriate poems of lasting merit. His "Old Ironsides," which he used as an illustration in that first essay, had already become a national lyric. Dr. Holmes is a sworn foe of humbug, but he assails it not with denunciation but with the barbed arrows of ridicule. He has not hesitated to expose the quackeries and foibles of the learned profession, including his own. Yet behind all his fun and humorous extravagance there is a sound and healthy sympathy with what is true to nature and genuine in art. His occasional poems, delivered before gatherings of professional and college friends, are charming with their grace and polished wit.

In November, 1857, the *Atlantic Monthly* was founded, and Dr. Holmes was engaged to furnish some articles of general interest. Taking up a title which he used twenty-five years before, he gave to the world the genial observations of *The Autocrat of the Breakfast Table.* The mingled wit, shrewdness, and good humor of the comments, as well as the witty and pathetic poems introduced, created a strong public demand for their continuance. The characters dimly suggested were by a few strokes made more vivid, and the talk even took the form of a story. This tendency was still more manifest in the series called *The Professor at the Breakfast Table.* This in turn was succeeded by *The Professor's Story*, afterwards called *Elsie Venner; a Romance of Destiny.* In this Dr. Holmes at times crosses the border line from the region of facts into a region of physiological and psychological mystery, for which he has elsewhere shown strong predilection. Less weird in its effect, yet belonging to the same class, mingling medical truth and fancies with able delineations of character, is *The Guardian Angel* (1867). These stories had appeared in the *Atlantic Monthly*, and some other contributions were collected under the title *Soundings from the Atlantic* (1864). Still later another series appeared under the title *The Poet at the Breakfast Table* (1873), in which there was more discussion of books than in his earlier papers.

Dr. Holmes had also published some volumes of professional papers, in which his wit, good humor, and literary skill are seen as plainly as in his books for general readers. *Currents and Counter-Currents in Medical Science*, *Border Lines in Some Provinces of Medical Science* (1867), *Mechanism in Thought and Morals* (1871), indicate by their titles the range of subjects which he delights to treat. His poems, grave and gay, have been gathered in various volumes as *Songs in Many Keys* and *Songs of Many Seasons.* He has also published memoirs of his friends, John Lothrop Motley and Ralph Waldo Emerson.

Dr. Holmes gave his most popular book the subtitle, "Every Man his own Boswell." In his various publications, as well as in his attractive recitations of his poems, he has indeed made a full display of his own character. He has been the sympathetic connecting link between the self-limited culture of early New England and the unsparing critical tendency of the present day.

HOLST, Herman Eduard von, a German historian, was born at Fellin, Livonia, June 19, 1841. He was educated at Dorpat and Heidelberg, studying especially political economy and history. In 1867 he settled in New York, when he was correspondent of various newspapers, and also an editor of the *Deutsch-Americanisches Conversations-Lexicon.* In 1872 he was appointed professor of history in the University of Strassburg, and in 1874 he was called to a similar position at Freiburg. He has obtained a high reputation by his works *Verfassung und Demokratie der Vereinigten Staaten von Nord Amerika* (1873) and by his *Constitutional History of the United States* (4 vols. German, 1878–85; 5 vols. English, 1880–85). He also prepared a *Life of John C. Calhoun* (1884).

HOLT, Joseph, an American statesman, was born in Breckinridge co., Ky., Jan. 6, 1807. He was educated at St. Joseph's College, Bardstown, Ky., and at Centre College, Danville, Ky. In 1828 he began to practice law at Elizabethtown, Ky., but in 1832 removed to Louisville, and in 1835 to Port Gibson, Miss. Returning to Louisville in 1842, he acquired an extensive and lucrative practice. In 1857 he was appointed commissioner of patents, and in 1859 was called into Pres. Buchanan's cabinet as postmaster-general. He succeeded John B. Floyd as secretary of war in January, 1861, while the cabinet was embarrassed by the secession movement. Holt firmly maintained the right and duty of the national government to resist attacks on its existence and property. At the close of Buchanan's administration Holt retired from the war department, but afterwards served in civil departments until September, 1862, when he was appointed judge-advocate-general of the army. In 1864 he was placed at the head of the bureau of military justice, and declined the appointment of attorney-general. In March, 1865, he was made brevet major-general.

HOLTZENDORFF, Franz von, a German jurist, was born at Vietmannsdorf, Prussia, Oct. 14, 1829. He attended the gymnasium at Schulpforta and studied jurisprudence at Berlin, Heidelberg, and Bonn, taking his degree as doctor in 1852. He became privat-docent at Berlin in 1857, professor extraordinary in 1861, and full professor in 1873. In the same year he was made professor of jurisprudence at Munich. He was a member of the North German Parliament in 1867. He has devoted himself especially to the reform in the treatment of criminals, opposing capital punishment and laboring for the establishment of reformatory institutions, and has visited other countries of Europe to examine the penal systems. He has also labored for the improvement of public education. From 1861 to 1874 he edited the *Allgemeine deutsche Strafrechtszeitung;* since 1866, in company with Virchow, the *Sammlung gemeinverständlicher wissenschaftlicher Vorträge;* since 1872, with W. Oncken, the *Deutschen Zeit- und Streitfragen*, and since 1871 the *Jahrbuch für Gesetzgebung, Verwaltung und Rechtspflege des Deutschen Reichs.* He was president of the International Prison Congress at London in 1872, and of Institute of International Law at Munich in 1883. He has founded and assisted in many charitable and philanthropical societies. Among his numerous publications are *Französische Rechtszustände* (1859); *Die Reform der Staatsanwaltschaft in Deutschland* (1864); *Die Grundsätze und Ergebnisse des irischen Strafvollzugs* (1865); *Die Principien der Politik* (2d ed., 1879); *Encyklopädie der Rechtswissenschaft* (4 vols., 4th ed., 1882); *Handbuch des deutschen Strafrechts* (4 vols., 1871–77); *Zeitglossen des gesunden Menschenverstandes* (1884).

HOLYOAKE, George Jacob, an English secularist, was born at Birmingham, April 13, 1817. He was educated in the workingmen's schools of that city and afterwards became a teacher in them. In 1842 he published a tract which brought upon him a charge of blasphemy and atheism, and was imprisoned on account of it. In 1846 he founded a journal called *The Reasoner*, in which he advocated secularism as "the practical philosophy of the people." He has published many essays, among which are *A Logic of Facts* (1848); *Secularism* (1854–55); *The Limits of Atheism* (1861); *History of Co-operation in Rochdale* (1858); *Life of Robert Owen* (1859); *History of Co-operation in England* (2 vols., 1875–77). About 1857 he removed to London, where he opened a book store for the publication and sale of books on free-thinking and social reform. Since 1874 he has published the *Secular Review.* In 1880 he made a visit to the United States, and on his return published *Among the Americans* (1881).

HOLYOKE, a city of Massachusetts, in Hampden county, is on the W. bank of the Connecticut River, and on the Connecticut River Railroad, 8 miles N. of Springfield and 106 miles W. of Boston. It is the terminus of the Holyoke and Westfield Railroad. In 1848 a dam was here constructed 1018 feet in length, which furnishes immense water power. The fall is 60 feet in less than a mile. There are 20 paper-mills, 10 cotton- and woollen-mills, and several planing- and grist-mills. The city has a fine city hall, built of granite, 15 churches, 3 national banks, 2 savings banks, 3 convents, an orphanage, a Roman Catholic home for girls, 3 hotels, 4 weekly newspapers, and 2 monthly trade journals. The school system is excellent. There are 13 school buildings besides the Roman Catholic parish school-houses. There is also a free public library. Holyoke is one of the largest seats of the paper-making business in the United States, or, indeed, in the world. The river is here the seat of a considerable shad-fishery in the spring of the year. Holyoke is connected by bridge with South Hadley on the east side of the Connecticut, beyond which, at some distance to the north, is Mount Holyoke, rising 1120 feet above the sea level and about 7 miles long. Much nearer the town, and on the same side of the river, is Mount Tom, a sharp crest of trap, rising to a somewhat greater height. The population of Holyoke in 1870 was 10,733, but in 1880 it had increased to 21,915.

HOMER, Winslow, an American painter, was born at Boston, Feb. 24, 1836. He early evinced a talent for drawing, and after spending two years in a lithograph establishment began to make wood-engravings. In 1859 he settled in New York, working on *Harper's Weekly* and studying in the Academy of Design. In 1861 he drew many scenes of the war for *Harper's Weekly.* His experiences also furnished subjects for oil-paintings exhibited at the National Academy. Among these were many pictures of negro life, and especially Home, Sweet Home (1863). and Prisoners to the Front (1865). The latter attracted much attention when exhibited at Paris in 1867. Homer resided in New York, where he was made a member of the National Academy in 1865.

HOMESTEAD LEGISLATION. The Homestead act was approved by Pres. Lincoln on May 20, 1862. Since that time there have been occasional changes in its provisions, but these changes have been generally in the direction of extending rather than restricting the privileges it confers. The intent of the original law was to give to every citizen who would accept it as a home a farm of 160 acres, to be selected at will from any of the unappropriated public lands of the United States, and such is the effect of all the statutes on the subject as they now exist. The essential condition attached by the government to the grant of the homestead privilege is that the land shall be taken in good faith as a home. All the requirements of the law and the regulations prescribed by the General Land Office are based upon this theory. The homestead right is not conferred upon persons temporarily residing in the United States, nor upon minors, but an alien may acquire the right to initiate an entry by declaring his intention to become a citizen of the United States, and a minor who is in fact the head of a family is allowed the homestead privilege.

SeeVol.XII. p. 125 Am. ed. (p. 122 Edin. ed.).

An applicant, having selected the land he desires to enter, should satisfy himself before taking any further steps that no improvements have been made upon it which might become the basis of a pre-emption claim, or, if such improvements exist, that they have been abandoned. The right of a pre-emptor dates from the time he begins improvement of the land, and he is allowed in some cases three months in which to appear at the local office and make entry. If the land is free from such adverse claim the homestead applicant may then proceed to the land office for the district in which the land is located and ascertain whether the records of that office show any prior entry. If none is found he may appear before the register or receiver and make the prescribed affidavit as to age and citizenship, and that the entry is made for his own exclusive use and benefit and for actual settlement and cultivation. Then, upon payment of the fees and commissions, which vary, according to circumstances, from $1 to $12, the entry is complete, and the applicant receives as his evidence of title the receiver's duplicate receipt. This paper contains the full description of the land by section, township, and range, and must be surrendered or its loss accounted for when final proof is made.

The initiatory steps toward the acquirement of title to the homestead are thus taken, and they give to the entryman what is called an "inceptive right" only. To secure a patent he must proceed to establish, within 6 months, his residence upon the land, and he must reside upon and cultivate it continuously for 5 years. During this period he must have no other home; but the fact that he is the owner of land elsewhere does not at all affect his right of homestead entry. If in active service in the army or navy, the residence of the applicant's family upon the land is considered sufficient; and in favor of soldiers of the war of the rebellion it is provided that the term of their service during the war, to the extent of 4 years, may be deducted from the 5 years' residence required by law; and a soldier honorably discharged by reason of wounds or disability contracted in the service may be so credited with the entire term of his enlistment. Therefore patent may be issued to a person claiming the benefit of these provisions, and who is entitled to credit for 4 years' service in the army, upon proof of one year's residence upon the land.

As the area of the unappropriated public lands diminishes from year to year, the interpretation of the laws regarding residence and cultivation become more strict. At the present time the government keeps in the field a force of special agents and inspectors, whose duty it is to examine into the validity of entries suspected of being fraudulent and to report to the commissioner of the General Land Office at Washington for cancellation all entries where the law has not been complied with in good faith.

At this stage in the progress of a homestead entry the title to the land remains in the government. The settler may relinquish to the United States, but he has no title which he can convey to another; and, since the entry may never be completed, no act of the entryman can fix upon the land any obligation. Neither the land nor the improvements upon it are subject to execution for debt, nor can they be taxed. This immunity continues until the settler has received his patent from the government, and in most of the States and Territories local laws provide that the homestead may not be levied upon under execution after patent has issued.

In addition to making his residence upon the land the homestead claimant must cultivate it and must make such improvements as will satisfy the register and receiver of the perfect good faith of the entry. A habitable house must be built, with such appurtenances as are usually considered essential to a home in the region in which the land is situated. As a rule a reasonable portion of the quarter-section must be brought under cultivation. In grazing districts the establishment of a dairy upon the land has been held sufficient.

If the homestead settler does not wish to remain 5 years upon the land he may pay for it with cash or scrip or land warrants at the rate of $1.25 per acre, or, if the land is situated within the limits of a railroad land-grant, at the rate of $2.50 per acre. This privilege of commutation is by present rulings restricted to homestead claimants who have never exercised their right of pre-emption.

Final proof must be made within 7 years from the date of the homestead entry. This proof consists in the affidavit of the settler that he is a citizen of the United States and that he has complied with the requirements of the homestead laws in every particular. A full description of his improvements must be given, and his statements must be corroborated by the affidavits of two disinterested witnesses. Public notice by advertisement in a newspaper in the land district must be given by the settler that he intends to make final proof on a date named before the register and receiver, or some other officer authorized by law to receive such proof, and the local land officers must also be notified. These provisions are intended to afford an opportunity to any one who may desire to contest the claim to be present with adverse evidence.

Where application is made to contest the validity of a homestead entry on the ground of abandonment, the contestant must file his affidavit with the district land officers, accompanied by the affidavits of one or more witnesses in support of the allegations made, setting forth the facts on which his application is founded, describing the tract and giving the name of the settler. Upon this the officers will set apart a day for hearing, giving all the parties in interest due notice of the time and place of trial. The contestant must defray the expenses incident to such a contest. If he succeeds in the contest, and procures the cancellation of the entry, he will be notified thereof, and for a period of 30 days from such notice will be allowed a preference right over any other person to institute a claim to the land.

As the law allows but one homestead privilege, a settler relinquishing or abandoning his claim cannot thereafter make a second entry; although where the entry is cancelled as invalid for some reason other than abandonment, and not the wilful act of the party, he is not thereby debarred from entering again, if in other respects entitled, and may have the fee and commissions paid on the cancelled entry refunded on proper application. Where a party makes a selection of land for a homestead, he must, as a general rule, abide by his choice. If he has neglected to examine the character of the land prior to entry and it proves to be infertile or otherwise unsatisfactory, he must suffer the consequences of his own neglect. In some cases, however, where obstacles which could not have been foreseen, and which render it impracticable to cultivate the land, are discovered subsequently to entry (such as the impossibility of obtaining water by digging wells or otherwise), the entry may, in the discretion of the commissioner of the General Land Office, be cancelled and a second entry allowed. But in the event of a new entry, the party will be required to show the same compliance with law in connection therewith as though he had not made a previous entry, and must pay the proper fees and commissions upon the same.

If the homestead claimant's proof is satisfactory to the register and receiver the final fees and commissions are paid and the applicant receives his final certificate, which constitutes his sole evidence of title until the papers can be forwarded to Washington and patent issued by the President.

During the fiscal year ending June 30, 1885, 7,415,885 acres were entered under the homestead laws, during the preceding fiscal year the entries amounted to 7,831,509 acres, and for the fiscal year 1883 8,171,914 acres. This shows a slight decrease during the past three years. From 1863 the acreage entered increased steadily, until in 1883 the highest figures were reached. The total area entered under the provisions of the Homestead act, from its passage to the close of the fiscal year 1885, amounts to 90,462,500 acres. (See PUBLIC LANDS.) (E. P. H.)

See Vol. XII. p. 129 Am. ed. (p. 126 Edin. ed.).

HOMŒOPATHY, compounded of the Greek words, ὅμοιον, like, similar, and πάθος, disease, or condition, denotes a similarity or correspondence of disease or condition as opposed to *Allopathy* (ἄλλον, other, different, and πάθος), signifying a dissimilarity of disease or condition. The name was applied to a system of therapeutics by its chief expositor, Dr. Samuel Hahnemann. The law of this system is tersely expressed, "*Similia similibus curantur*"—"Like diseases are cured by like remedies." The enunciation of this law, as governing isolated cases, dates from Hippocrates, but its universality, united to a method of its application in therapeutics, was first promulgated by Hahnemann, who was led to a belief in its truth very slowly and as a result of painstaking experiment. It was while translating, in 1790, from the English into German, Cullen's *Materia Medica*, that Hahnemann met with the assertion by Cullen, under the article on *Cinchona*, that "it is established as a fact that both astringents and bitters, in their simple and separate estates, have proved often sufficient to prevent the recurrence of intermittent fever;" to this Hahnemann added in a footnote that "much more bitter and astringent substances than Peruvian bark might be prepared from the extracts of quassia and nut-gall, but that the compound cannot cure any intermittent fever of six months' duration." Cullen further says: "Whilst it is allowed to be a very safe and powerful remedy, the only question, which remains respecting it, is: In what circumstances may it be most properly employed?" This question Hahnemann set himself to answer. Knowing that Cinchona when administered to persons in health produces febrile symptoms, Hahnemann prepared an alcoholic tincture of *Cinchona officinalis* and took a dose of it himself, whereupon he felt symptoms which were, in a remarkable degree, *similar* to those of the peculiar fever for which the bark was pre-eminently the cure, and in which its administration had been successful. Was this then the test? Does the cure of a disease reside in that drug which when administered in health produces a *similar* disease, just as similar waves of light or of sound will neutralize each other? Many experiments could alone verify this law, if such it were, and to this verification Hahnemann devoted himself, in the course of which it was proved beyond a doubt that Cinchona when administered to healthy persons effected peculiar changes in the system; and a careful comparison of these changes, or symptoms, with the symptoms of intermittent fevers which had been cured by doses of Peruvian bark, revealed their similarity in all cases. Thus, for instance, to cite some of the leading distinctions which should guide a physician in the administration of Cinchona, Hahnemann discovered that this drug should be given when the attack begins with some preliminary symptoms before the occurrence of the chill, such as palpitation of the heart; or when there is no thirst either during the chill or the fever; or when there is much determination of blood to the head during the fever, etc. In short, only those cases demand this medicine wherein all the morbid symptoms which occur during the apyrexia, as well as those of the paroxysm, most closely correspond to those produced in health by the bark itself. Having satisfied himself that *Similia similibus curantur* held good with regard to Cinchona, Hahnemann undertook a similar investigation of other remedies, and in each case with corresponding results. The specific virtue of Mercury in cases of syphilis had long been known, but it became clear from Hahnemann's investigations that the change of organization produced by Mercury in healthy persons manifested great similarity to syphilis. Sulphur, the well-known specific against itch, produces on the healthy subject an eruption similar to that disease. Jenner's discovery may be also cited in confirmation, where inoculation of the cow-pox destroys the susceptibility to the small-pox. Early in his investigations Hahnemann observed that children who had been poisoned by the berries of *Belladonna* were sometimes attacked by an eruption resembling that of scarlet fever, and he found by experiment that this same Belladonna, when given as a remedy in the scarlet fever of that day, cured the disease, and that it likewise served as a prophylactic.

Having convinced himself that he had discovered a law of nature, he set to work to find out the method of its application. It is clear that all drugs produce disease; that is, deviations from the standard of health. It is to be presumed that every drug produces a peculiar, characteristic disease, which may be termed an artificial disease. If, then, artificial drug diseases are to be employed in counteracting natural diseases, we must have a knowledge of drug diseases commensurate with the infinite variety of natural diseases. He therefore applied himself to form a new *Materia Medica*, based on the recorded effects of drugs upon the healthy human subject, a work which he continued to the end of his life.

At the very outset of his practice under the new law Hahnemann encountered an obstacle which might have proved insurmountable to a less practical mind. To a patient suffering from an acute disease the administration, in the ordinary dose, of a drug which creates a similar disease, so far from effecting an immediate cure, produced, very naturally, an aggravation of all the characteristic symptoms. The reason of this was not far to seek. Diseased organs are extremely sensitive, and the medicine, homœopathically administered, affected the very organs already suffering from a natural disease. To this aggravation of the disease there usually followed, to be sure, a crisis and a rapid recovery, yet the aggravation sometimes proved so alarming as to demand the use of antidotes. This unhappy result threatened to render the discovery of the new law barren, until it occurred to Hahnemann that the ordinary dose was too large. Instead, therefore, of administering a whole drop of the tincture of Belladonna (which was the first drug with which he experimented) he diluted one drop with ninety-nine drops of alcohol, and of this dilution he gave one drop as a dose. To his astonishment even this one-hundredth of a drop of the tincture produced excessive aggravation. Again he diluted this one-hundredth of a drop with ninety-nine drops of alcohol, and administered as a dose one drop of this second dilution, but with no expectation that it would produce more than a very insignificant effect. In the majority of cases, however, a more rapid cure followed, but to his intense astonishment the same aggravation of symptoms invariably ensued. Again he diluted, as before, this ten-thousandth of a drop, but so far from the sequent aggravation being greatly diminished the medicinal energy seemed actually to have developed, so that a dose of this, the millionth of a drop of the tincture, when given to very sensitive children, demanded an antidote. Rather encouraged than discouraged Hahnemann continued his dilutions until he found that while the aggravating effects of the drug gradually diminished, its curative powers remained fully the same, nay, were hastened by no longer having the cure delayed by the excessive aggravation. Even up to the thirtieth dilution he found, in highly sensitive temperaments, an inconvenient increase of symptoms, and he therefore diminished the dose of one drop by saturating with the liquid of the final dilution one hundred small pills of sugar of milk, and, with these, obtained satisfactory results.

From time to time Hahnemann published the results of his experiments, asking for them merely a fair trial, which is after all their only and ultimate test. He demanded the acceptance of no theory; he had none to offer during the development of his system, but having been led, step by step, by actual experience, all he requested was that his brother physicians should candidly test his results and verify his facts. In 1810 he published the *Organon of Homœopathic Medicine*, wherein his system was at last set forth. Thirteen years later he issued a fifth edition, and from this, the last from his hand, the following abstracts are made, as affording the best exposition of Homœopathic practice:—

Great stress is laid on the rule that it is against the symptoms in their combined sum that the physician's art is to be directed. These symptoms are the deviations from the standard of health, and constitute the disease as far as the prescriber is concerned, who has nothing else to guide him but what is manifest to his senses. With the subtle cause of the disease he need not be concerned; the cause is always of an immaterial nature; about it, even if it could be discovered, there might exist a difference of opinion; but let the perceptible manifestations of that cause be removed and the disease is cured. The sum of the symptoms, therefore, and that alone, must guide the physician in the choice of his remedy.

Since the only curative effect of drugs lies in their power to produce changes in the human system, it behooves us to learn by experiment the exact nature and quality of the changes which each drug causes. The exact nature of these changes can be measured only by its symptomatic departure from a fixed standard, which must be, necessarily, that of health. All other standards cannot but be fluctuating and fallacious. The character of the symptoms produced by drugs having been thus most exactly ascertained, it follows that drugs will become medicinal only by creating an *artificial* disease which will counteract the disease already present, or, if it may be so termed, the *natural* disease. Wherefore, in practice, we must select a medicine which will create symptoms either similar or opposite to those already present; whichever experience shows to be the easier, safer, and more enduring means of restoring health. Other than these two methods of treating disease, viz., by creating, artificially, similar symptoms, or opposite symptoms, there exists only a third, viz., the Allopathic method; whereby remedies are given which bear to the natural disease no correlation whatever, but which create symptoms neither similar nor opposite, but wholly dissimilar.

As it is not the province of this article to enter into the polemics of therapeutics, it suffices to say that Hahnemann proves to the entire satisfaction of himself and of his followers that, of these three methods, Homœopathy, or the Law of the Similar Remedy, is alone capable of effecting a speedy, safe, and enduring cure. To disprove the efficacy of *Contraria contrariis curantur* he adduces the homely instances, drawn from common experience, of burns which are not cured by cold but by heat, of frost-bitten limbs which are exposed not to heat but to cold. To disprove the utility of Allopathy he denies that diverting a disease to organs not diseased effects a permanent cure, though it may give temporary relief; equally futile is it to follow nature, as it is termed, for nature is blind and unintelligent; nature cannot tie an artery, or draw together the gaping lips of a wound, or heal a stricture; nor will getting rid of the secretions produced by disease effect a cure any more than blowing the nose will cure a cold in the head; nor is it necessary, in cases which are not surgical, to attempt to remove the supposed cause of a disease; the cause, which is often very occult, if not utterly beyond our ken, expresses itself in the symptoms, and if these be cured the cause is removed. There remains, accordingly, "no other method of profitably applying medicines than the Homœopathic, whereby we select that medicine the action whereof upon persons in health is known, and which produces an artificial disease [not identical, be it observed, but] the closest in resemblance to the entire sum of the symptoms of the natural disease." This result, Hahnemann maintains, is founded upon the Therapeutic Law of Nature that a disease in man is permanently extinguished only by one that is most similar but artificially produced. This is maintained to be an irreversible, infallible Law of Nature, not a theory nor a dogma, but a law inviolable. In thus founding his system of therapeutics upon a Law of Nature Hahnemann elevates medicine to a science, and removes from it the reproach of empiricism. If his law be not a law, of course his whole system topples headlong, but he claims that it is a law inductively founded upon innumerable instances, "however unsatisfactory may be the theory of the manner in which it acts." Hahnemann asserts that he attaches no value whatever to any explanation, his own included, that can be given of this phenomenon. After this assertion it is not worth while to state at length the explanation which, in default of a better, Hahnemann himself suggests, more especially since it has been rejected by some of his most eminent followers. But for the sake of any explanation which may be attempted he calls attention to the facts upon which he founded his own theory, viz. that the human system is more sensitive to the action of a drug than to the assaults of a natural disease arising from miasm, etc. This is proved by the fact that all men are not smitten by an epidemic even when all are equally exposed to it, whereas all men, at all times, and under all circumstances, are affected by drugs or poisons; or, in other words, natural morbific influences exert only conditional power, while medicinal influences exert a power which is absolute, direct, and greatly superior to that of the former, yet at the same time running commonly a more brief and rapid course. When therefore to the natural disease the similar drug disease has been added (the same organs in each case being thereby affected), the greater intensity of the drug disease has full scope and gives the power of overriding and of obliterating the natural disease. Without this resemblance between the two diseases the mere intensity of the drug will not effect a cure. Nature herself cannot effect a genuine cure by the excitement of a new yet dissimilar disease, be the intensity of the latter ever so great. Hahnemann then illustrates this law of nature by reference to the three following instances:

First: If a patient be exposed to two *dissimilar* diseases which have an *unequal* power, or if he be already attacked by one which is more violent or more pronounced in its character, the weaker or newer will be repelled or expelled by the stronger or older, and will not be able to obtain a lodgment. Thus a patient suffering from a severe chronic disease will never be subject to an attack of autumnal dysentery or any other mild epidemic disease. According to Larrey, the plague peculiar to the Levant never breaks out where scurvy prevails, nor does it ever attack those who are suffering from herpetic ailments. According to Jenner, the rickets prevents vaccination from taking effect, and Hildebrand informs us that persons suffering from phthisis are never attacked by epidemic fevers unless the latter are extremely violent.

Secondly: If the *new* disease, which is *dissimilar* to the old, be the *more powerful*, it will cause the suspension of the old disease, until the new has either run its course or is cured; then the old disease reappears. Where the measles and the small-pox exist together and have both attacked the same infant, it is usual for the measles, even after they have already declared themselves, to be arrested by the small-pox, and not to resume their course until after the cure of the small-pox. On the other hand Manget has seen the small-pox, which had fully developed itself after inoculation, suspended during four days by the measles, and after the desquamation of which it revived, to run its course. It is the same with all diseases which are *dissimilar:* the stronger suspends the weaker (except in cases where they blend together, which rarely occurs in acute diseases), but they never cure each other reciprocally.

Thirdly: It sometimes occurs that the new disease, after having acted for some time in the system, joins itself finally to the old and dissimilar disease, and thence results a complication of two different maladies, both of them incapable of annihilating or curing the other. Venereal symptoms are effaced and suspended in the first instances whenever a psoric eruption commences, but in process of time the venereal affection being at least quite as powerful as the psoric, the two unite—that is, each seizes upon those parts of the organism which are its especial field, whereby the patient is rendered worse and the cure more difficult.

But the result is far different when two *similar* diseases meet. They can neither *repel* each other, as in the first of the three instances just given, nor *suspend* each other, as in the second; nor, as in the third, can they *co-exist* and form a double or complicated disease; but they always destroy each other. The stronger defeats the weaker, and puts it to flight. Violent inflammation of the eyes, even to blindness, is caused, as is well known, by small-pox, and yet by inoculation with small-pox chronic inflammations of the eyes have been perfectly cured, as reported by Dezoteux and Leroy. Deafness and asthma have been removed in the same way, according to Closs. The fever attendant upon cow-pox cured intermittent fever in two cases, as observed by Hardige the younger, a confirmation of John Hunter's remark that two fevers [being similar] cannot co-exist in the same patient.

It is upon the foregoing propositions that Hahnemann grounds his division of the healing art into three branches. First, stands the *Homœopathic*, the only true method, following nature in her most lawful mood, by inducing, through medicines, diseases most *similar* in their symptoms to the disease to be cured. Secondly, the *Antipathic*, which by exciting an opposite state to that which exists, is only palliative, ending in chronic diseases by making matters far worse. And lastly, the *Allopathic*, hitherto the commonest method, which aims at cure by exciting *dissimilar* affections. It is a proof of Hahnemann's fame that he has made these learned appellations current in men's mouths, and that the two leading medical sects are now generally known as *Homœopaths* and *Allopaths.*

In addition to the "law of the similars" there are two practical rules which Homœopaths maintain to be of essential importance. The first is "The Single Remedy." Great stress is laid on this rule. Even if the exact effects of a drug on the healthy be accurately known we are still ignorant of the effect upon an invalid of a combination of drugs which might oppose, and would certainly modify, each other. Hence, also, every drug homœopathically prescribed must be permitted to exhaust its power before another is given.

The second rule is "The Minimum Dose." What the smallest dose may be in every individual case must be left to the wisdom and experience of the practitioner, guided by close observation, regard being always had to the fact that too strong a dose injures the patient; and the injury is the greater the more homœopathic, or similar, the medicine, because, in the main, those organs only are affected by it which are already attacked by the natural disease. The result of Hahnemann's experience was that the dose should be graduated to such a degree of minuteness as to produce, at first, an almost imperceptible aggravation of the disease. As a corollary, he insists, naturally, that a dose must not be repeated until after its effect is ended. It is not infrequently alleged that the minute doses administered by Homœopathic physicians are not an essential part of their system, but that patients can be treated homœopathically—that is, by the law of the similars—and yet that large doses may be administered. This is true only in theory; in practice it is found that a large dose thus given defeats its purpose and instead of healing aggravates the disease. It was this fact, as we have seen, that led Hahnemann to diminish the dose, and to continue to diminish it until it no longer produced undue aggravation. If, as it is argued, disease is of a spiritual or immaterial, dynamic origin, the action of drugs, which is also disease, must be of a spiritual nature also. The material substance of a drug, it may be supposed, is merely the physical expression of the hidden power; the material substance is "the muddy vesture of decay which hems" the essence in, and the more we free the essence from the grosser body the more freedom of action it develops. This process of elimination Hahnemann called *potentizing*, and in order that all drugs at each stage of elimination may have a uniform degree of potency he laid down certain rules to be followed in the preparation of medicines. Obviously the simplest way of attenuating solid substances is by trituration, but as the minute particles of most substances, when reduced to fine dust, have an attraction for each other, and a tendency to cohere, it becomes necessary to triturate with a foreign substance, which will not only prevent this cohesion but assist in the continued mechanical subdivision. Hahnemann selected sugar of milk as this foreign substance on account of its innocuousness and its capacity of extremely minute subdivision. One grain of the drug therefore is mixed with 99 grains of sugar of milk; this proportion is arbitrary: some physicians prefer the decimal ratio of one to nine; all that Hahnemann aimed at was uniformity, and, to this end also, he directed that the trituration should be carried on for one-half hour; whereupon one grain of this mixture is again triturated with other 99 grains of milk. This is called the second potency. This process is to be continued until the number of triturations has been deemed sufficient. In the case of tinctures the medium for greater mechanical subdivision instead of being sugar of milk is alcohol, and shaking is substituted for trituration. Again, for the sake of uniformity, Hahnemann lays down certain rules for the preparation of dilutions, namely: that they must be shaken a certain number of times, etc., and the shaking, or *succussion*, as it is called, imparts a higher curative power to the medicine by immaterializing it. This process of potentizing drugs by continuous trituration and dilution has been carried to an extent whereat it would seem physically impossible that any material trace of the original substance can survive, and yet so far from losing thereby their curative powers many Homœopathic physicians maintain that these are very greatly increased. Certain it is, however, that the microscope and spectroscope reveal material traces of the original substance in some of the triturations and dilutions far beyond the point where we might reasonably expect it to have utterly vanished. Mayrhofer, with a magnifying power of 300 diameters, observed distinct signs of the presence of platina, of gold, in the tenth trituration, as also of metallic mercury. Metallic iron is still visible under a magnifying power of 300 diameters in the seventh and eighth attenuation. A patient therefore who takes a grain of the third centesimal trituration of tin or arsenic swallows the amazing number of 115,200,000 particles of the medicine, and, if it be prepared according to the decimal scale, no less than 576,000,000 particles, each of which necessarily possesses all the properties of the metal. While the diameter of the smallest metallic particles thus observed is shown to be from $\frac{1}{200}$ to $\frac{1}{2000}$ of a line, the diameter of the blood globule is only $\frac{1}{300}$ of a line; there is therefore no part of the system into which these drugs thus prepared may not freely penetrate. By means of this trituration and dilution many substances, such as vegetable Charcoal, Lime, Silica, Lycopodium, etc., which in their crude state possess no medicinal properties, become prominent in the Homœopathic *Materia Medica* for their curative power.

Hahnemann's methods of preparing medicines have not been formerly followed; subsequent investigators have claimed greater efficacy for certain modifications of the original processes, and machines have been invented whereby the physical labor of preparing triturations and dilutions has been greatly abbreviated.

In ascertaining or proving the effects of drugs upon the healthy, the Homœopathic school, with unceasing vigilance, has endeavored so to conduct the experiments that the results shall be absolutely trustworthy. To attain this it has been deemed requisite to make as many experiments on as many individuals as possible, of all ages and of both sexes, of different constitutions and temperaments, of all habits and peculiarities, in different climates, at different seasons, in different states of the weather, etc., etc. As diversities of constitution and disposition are required, perfect health is not demanded, provided the prover has the ability to distinguish his habitual abnormal symptoms from any unusual or new symptoms. The substance to be proved must be of the very purest, and one dose only, according to Hahnemann, is to be taken, but such a dose as is sufficient to produce an effect without seriously endangering health. Hahnemann's general rule, in regard to drugs already known and used, was to take such a dose as in most cases of illness had been considered efficacious by the Allopathic school. Great stress is laid upon all symptoms of effects upon the *mind*, and the greatest accuracy, in this regard, enjoined upon the provers. The symptoms which are common to all the provers are considered characteristic of the drug. Some extremely characteristic symptoms often serve as a so-called "key-note" to a whole train of drug effects. In short, the exactest rules are laid down that ingenuity, quickened by search after facts, can devise.

The law of Therapeutics laid bare by Homœopathy is of so recent discovery that the wisest of its adherents shrink from the assertion that all its relations and bearings have yet been fathomed. Thus far, however, the fact that it is in harmony with the known laws of Light, and of Heat, and of Motion, gives assurance that it will be eventually acknowledged by all as a factor in the awful formula of the universe. In the present tendency of the age to accept the mightiest effects as springing from immaterial causes, when the basis of modern science is laid on atoms and molecules that no human eye has ever seen or can see, and which require almost a poet's brain to imagine, the believers in infinitesimal doses discern the final recognition of their system. In the meantime, Homœopathy is fairly entitled to the praise which even its bitterest opponents accord to it, that if it does not effect good it certainly works no harm—no small praise, negative though it be, when the infinitely complex and delicate structure of the mysterious human organization is in question.

Homœopathy was introduced into the United States in 1825 by Dr. Gram, a native of Boston, but educated in Copenhagen. His success attracted the attention of Gray, Channing, and a few others. Constantine Hering (*q. v.*) soon became the recognized leader of the new school of therapeutics in the United States. There are not less than 10,000 practitioners of Homœopathy in the United States, with an estimated clientele of 10,000,000 persons. The hospitals number 54, in which, during 1885, 24,000 patients received treatment; the dispensaries are 48 in number, 113,000 patients having received treatment during 1885. The American Institute of Homœopathy, organized in 1844, is the national society. There are 4 sectional societies, 29 State societies, 122 local societies, a publishing society, and several miscellaneous ones. The medical journals devoted to Homœopathy number 22. During 1885 fifty books were published, the literature on practical subjects being particularly rich for a school so young. See MEDICAL COLLEGES. (H. H. F.)

HOOD, EDWIN PAXTON (1820–1885), an English preacher and author, was born at Westminster in 1820. He became a minister among the Independents, and had a church in London. He was busily engaged in literary work, and for several years was editor of the *Eclectic Review*, and again of the *Preacher's Lantern*. He published many minor works, a volume on the preacher's vocation under the quaint title, *Lamps, Pitchers, and Trumpets; The Villages of the Bible; Life of Rev. Thomas Binney; The Genius and Philosophy of Thomas Carlyle; Oliver Cromwell*, and other popular books. He edited *The World of Anecdote* and *The World of Religious Anecdote*. He died at London, June 15, 1885.

HOOD, JOHN BELL, an American general, was born at Owingsville, Ky., June 29, 1831. He graduated at West Point in 1853, and entered the infantry, but was transferred to the cavalry in 1855. He was severely wounded in a fight with the Comanches and Lipans in Texas, July 20, 1857. He was made first-lieutenant Aug. 18, 1858, and was chiefly engaged in frontier duty until the outbreak of the civil war, when he assisted in handing over the U. S. troops in Texas to the secessionists. He resigned his commission, April 16, 1861, and raised a regiment of Kentuckians for the Confederate army. He commanded a brigade under Gen. A. S. Johnston, and afterwards under Gen. Bragg, but joined the Army of Virginia in the spring of 1862. He assisted in the defence of Richmond against McClellan, and fought at the second battle of Bull Run. He was promoted major-general, and at Antietam, in September, 1862, he commanded a division; he also fought at Fredericksburg, and at Gettysburg, where he was severely wounded, July 2, 1863. Rejoining his command in Georgia, he fought again at Chickamauga, where he lost a leg, and was made lieutenant-general. From the command of a corps in the army of Gen. J. E. Johnston, whom Sherman had forced back into Atlanta, Hood was raised, in obedience to a popular demand, to the full command. Three bold but unsuccessful attempts were then made to drive Sherman off, but on Sept. 1 Gen. Hood was compelled to evacuate the city. Then he made a rash attempt to cut Sherman's communications, fought the battle of Franklin, Nov. 30, and pushed as far north as Nashville, where he was repulsed by Gen. G. H. Thomas, Dec. 17, 1864. Having entirely failed to check Gen. Sherman's progress, he was relieved of his command in January, 1865, by Gen. Richard Taylor. After the war Gen. Hood settled in New Orleans.

HOOKER, SIR JOSEPH DALTON, a British botanist, was born at Glasgow in 1817, being the son of the distinguished botanist, Sir William Jackson Hooker. He studied medicine and accompanied Capt. James Ross in his Antarctic exploring expedition (1839–43) as assistant-surgeon, and on his return published *Flora Antarctica* (2 vols., 1845–48), a valuable contribution to the knowledge of distribution of plant-life. He was afterwards employed as botanist in the geological survey of Great Britain, and in 1847 he made a botanical exploration of the Himalaya Mountains. In 1855 he became assistant to his father, then director of the Kew Gardens, and in 1865, on his father's death, succeeded him in this post. In 1871 Dr. Hooker visited Morocco and explored some of the Atlas Mountains. In 1868 he was president of the British Association for the Advancement of Science. In 1877 he visited the United States. He has received degrees from the Universities of Oxford and Dublin, and many marks of honor from foreign societies. His publications include *The Rhododendrons of the Sikkim Himalaya* (1849–51); *Himalayan Journals* (2 vols., 1854); *Flora of New Zealand* (2 vols., 1853–55); *Flora Tasmaniæ* (1855); *Student's Flora of the British Islands* (1870); *Flora of British India* (1872). He has also published, in conjunction with G. Bentham, *Genera Plantarum* (3 vols., 1862–83).

HOOKER, WORTHINGTON (1806–1867), an American physician, was born at Springfield, Mass., March 2, 1806. He was educated at Yale College, and received the degree of M. D. from Harvard Medical College in 1829. He settled in Norwich, Conn., and in 1852 was made professor of the theory and practice of medicine at Yale College. In 1864 he was vice-president of the American Medical Association. He died at New Haven, Conn., Nov. 6, 1867. His publications include *Physician and Patient* (1849); *Lessons from the History of Medical Delusions* (1850); and a series of text-books in physiology, chemistry, and natural history.

HOPKINS, EDWARD (1600–1657), colonial governor of Connecticut, was born at Shrewsbury, England, in 1600. He was a merchant in London, and came to Boston with Rev. Mr. Davenport in 1637. Then removing to Hartford he was chosen a magistrate in 1639, and from 1640 to 1654 was governor of Connecticut alternately with Haynes. In 1643 he helped to form the union of the New England colonies. Having returned to England, he became warden of the fleet, commissioner of the admiralty, and member of Parliament. He still gave assistance to his friends in New England, and at his death left his estate there for support of schools in New Haven and Hartford, besides a bequest of £500, which was by decree of chancery paid to Harvard College in 1710.

HOPKINS, ESEK (1718–1802), first commander of the American navy, was born at Scituate, R. I., in 1718. At the commencement of the Revolutionary war he was commissioned by Gov. Cooke as brigadier-general, and in December, 1775, by Congress, as commodore and commander-in-chief of the navy. Putting to sea in February, 1776, with a squadron of four ships and three sloops, he sailed to the Bahamas, and captured the forts at New Providence with 80 cannon and stores of ammunition. Off Block Island on his return he captured a British schooner and bomb-brig, but two days later, having attacked the Glasgow, of 29 guns, allowed it to escape. In June, 1776, he was ordered by Congress to appear before the naval committee for not annoying the enemy's ships off the southern coast, and being defended by John Adams was acquitted, but was finally dismissed, Jan. 2, 1777. He resided near Providence, and was often a member of the Rhode Island general assembly. He died at North Providence, R. I., Feb. 26, 1802.

HOPKINS, JOHN HENRY (1792–1868), an American bishop, was born at Dublin, Ireland, Jan. 30, 1792. He came to America with his parents in 1800, and received a classical education. He spent a year in a counting-room in Philadelphia, and assisted Wilson, the ornithologist, in preparing the plates of his work. About 1810 he engaged in iron manufacture in the western part of Pennsylvania, but becoming bankrupt in October, 1817, studied law and was admitted to the bar in Pittsburg. In November, 1823, he took dea con's orders in the Episcopal Church, and priest's orders in May, 1824, and became rector of Trinity Church, Pittsburg. When a new building was needed, he studied Gothic architecture, in order to become its architect. In 1831 he was called to Trinity Church, Boston, as assistant minister, and he became also professor of systematic divinity in a newly established theological seminary. He was elected the first bishop of Vermont, and was consecrated in New York, Oct. 31, 1832. He became at the same time rector of St. Paul's Church, Burlington, and also established a boys' school. The expense of buildings for the latter involved him in pecuniary difficulties, and compelled him to sacrifice his property. In 1856 he resigned his rectorship, in order to devote himself to diocesan work and the building up of the Vermont Episcopal Institute. He was an able preacher, a vigorous and thoughtful writer, an earnest defender of high-church principles. He was presiding bishop of the United States after the death of Bishop Brownell in 1865. As such he took a prominent part in the Pan-Anglican Synod at Lambeth in 1867, and at that time received from the University of Oxford the degree of D. C. L. He died at Rock Point, Vt., Jan. 9, 1868. Among his numerous publications, besides sermons, were: *Christianity Vindicated* (1833); *The Primitive Creed Examined and Explained* (1834); *The Primitive Church* (1835); *The Church of Rome in her Primitive Purity* (1837); *Twelve Canzonets*, words and music (1839); *Refutation of Milner's End of Controversy* (2 vols., 1854); *The American Citizen* (1857); *Vindication of Slavery* (1860); *Law of Ritualism Examined* (1867). His *Life*, by his son, Rev. Dr. J. H. Hopkins, appeared in 1872.

HOPKINS, Mark, an American clergyman and educator, was born at Stockbridge, Mass., Feb. 4, 1802, being a grandson of Mark Hopkins, an officer in the Revolutionary army. He graduated at Williams College in 1824, and was tutor there for two years. Then studying medicine he received the degree of M. D. in 1828, and began the practice of medicine in New York. In 1830 he was made professor of moral philosophy and rhetoric in Williams College, and in 1836 he became president of that institution. After discharging the duties of this position with great fidelity and success for thirty-six years, he resigned in 1872, but remained professor of mental and moral philosophy until 1882, when he was made emeritus professor. He was also pastor of the College Church, and throughout his career exerted a marked influence on those under his tuition. He was also active in the American Board of Commissioners of Foreign Missions, and in 1857 was elected its president. Among his publications are *Lectures on the Evidences of Christianity* (1846; new ed., 1864); *Miscellaneous Essays* (1847); *Lectures on Moral Science* (1862); *Baccalaureate Sermons* (1863); *Law of Love, Love as a Law* (1869); *Outline Study of Man* (1873).

HOPKINS, Samuel (1721–1803), an American theologian, was born at Waterbury, Conn., Sept. 17, 1721. He graduated at Yale College in 1741, and studied divinity with Jonathan Edwards. In 1743 he was ordained pastor of the church in Housatonnac (now Great Barrington), Mass. He was also a zealous missionary to the Indians in that neighborhood. His ministry was often interrupted by the French and Indian wars, and sometimes his family had to flee to other towns for safety. He was dismissed in January, 1769, and began to preach at Newport, R. I., where he became pastor in April, 1770. When the British took possession of Newport in 1776 he left the town and preached in various places. Returning in 1780 he found his parish so impoverished that for the remainder of his life he depended on weekly contributions and the aid of a few friends. In 1799 he had a paralytic stroke, from which he never fully recovered, though he was able to preach occasionally. He died at Newport, R. I., Dec. 20, 1803. Dr. Hopkins earnestly opposed domestic slavery and the slave-trade, which then flourished at Newport. By his sermons, letters to influential men, newspaper essays, and especially by his famous *Dialogues*, he aroused public sentiment against the system. In 1774 a law was passed forbidding the importation of negroes into Rhode Island. In 1784 the legislature enacted that all children of slaves born after the following March should be free. Dr. Hopkins had early formed a plan for evangelizing Africa, and colonizing it with free negroes from America, which was afterward the basis of the American Colonization Society. He was also noted as the founder of "Hopkinsian divinity," a modification of Calvinism, which is expounded in his *System of Doctrines* (1793). It is really the full development of the theology of Dr. Jonathan Edwards, by whom Hopkins was trained, whose manuscripts he had studied, and several of whose treatises and sermons he had edited and published. Dr. Hopkins also wrote *The Wisdom of God in the Permission of Sin* (1759); *True State and Character of the Unregenerate* (1769); *Nature of True Holiness* (1773); and other theological treatises and religious biographies. Most of his works were republished in 1805, and again at Boston in 1854. His *Autobiography* was published in 1805, and *Memoirs* of him have been published by Prof. E. A. Park (1854) and others. Dr. Hopkins is the hero of Mrs. H. B. Stowe's *Minister's Wooing*.

HOPKINS, Stephen (1707–1785), an American statesman, was born at Scituate, R. I., March 7, 1707, being brother of Com. Esek Hopkins. Removing to Providence in 1731, he became a merchant, and in 1732 was elected to the assembly, where he was made speaker. He was a delegate to Congress at Albany in 1754, and served on the committee to prepare a plan of union for the colonies. In the same year he was governor of Rhode Island, and so continued until 1768, except for four years. In 1773 he was a member of the committee of correspondence, and in 1774 was sent to the Continental Congress, where in 1776 he signed the Declaration of Independence. He was a member of the naval committee, and also of the committee which drafted the Articles of Confederation. He died at Providence, R. I., July 19, 1785. He published an account of Providence and *The Rights of the Colonies Examined* (1765).

HOPKINSON, Francis (1738–1791), an American judge and author, was born at Philadelphia in 1738. His father, Thomas, was a native of England, and held the office of judge at Philadelphia. The son was educated at the College of Pennsylvania, and studied law. In 1761 he was secretary of a treaty conference with the Indians of Pennsylvania. On his return from England in 1767 he settled at Bordentown, N. J., having married Ann Borden. In 1776 he was a delegate from New Jersey to the Continental Congress, in which he signed the Declaration of Independence. He was already noted for his witty and satirical writings. In 1779 he was made a judge of the admiralty of Pennsylvania, and held this office until it was abolished by the adoption of the Federal Constitution. Pres. Washington appointed him U. S. judge for Pennsylvania. Hopkinson died at Philadelphia, May 9, 1791. His political writings include *The Pretty Story* (1774); *The Prophecy* (1776); and *The Political Catechism* (1777). But more noted are *The Battle of the Kegs* (1777) and *The New Roof* (1788). He had collected for publication his *Miscellaneous Essays and Occasional Writings* (1792).

HOPKINSON, Joseph (1770–1842), an American jurist, son of the preceding, was born at Philadelphia, Nov. 12, 1770. He graduated at the University of Pennsylvania in 1789, and became a lawyer first at Easton, Pa., but soon returned to Philadelphia, where he was counsel for Dr. B. Rush in his libel suit against Cobbett in 1799, and for Fries in his trial for treason before Judge Chase. When Chase was afterwards impeached before the U. S. Senate, Hopkinson was chosen to defend him. In 1815 he was elected to Congress, but in 1819 he removed to Bordentown, N. J. In 1823 he resumed the practice of his profession in Philadelphia, and in 1828 Pres. J. Q. Adams appointed him U. S. judge for the eastern district of Pennsylvania. He was a prominent member of the State Constitutional Convention of 1834. He assisted in founding the Philadelphia Academy of Fine Arts, and was its first president. Many of his addresses before literary societies were published, but he is best known as the author of "Hail Columbia," which was composed in 1798 for the benefit of an actor. Hopkinson was a confidential friend of Joseph Bonaparte, who resided at Bordentown from 1815 to 1832. He died at Philadelphia, Jan. 15, 1842.

HOPPIN, JAMES MASON, an American clergyman and author, was born at Providence, R. I., Jan. 17, 1820. He graduated at Yale College in 1840, studied law at Harvard Law School, and theology at Andover Theological Seminary, graduating in 1845. In March, 1850, he became pastor of a Congregational church in Salem, Mass., and held this charge until 1859. In 1861 he was appointed professor of homiletics in the theological department of Yale College, and in 1879 he became in the same college professor of the history of art. He has published *Notes of a Theological Student* (1854); *Old England: its Art, Scenery, and People* (1867); *The Office and Work of the Christian Ministry* (1869); *Life of Admiral A. H. Foote* (1874); *Life of Henry Armitt Brown* (1880); *Homiletics* (1881).

See Vol. XII. p. 159 Am. ed. (p. 156 Edin. ed.).

HOPS. The Hop (*Humulus Lupulus*) is a member of the botanical order *Cannabinaceæ*, which has but one other species, *Cannabis Sativa*, or hemp. It is a common wild plant in the south of England, and occurs throughout Europe and parts of Asia. It is common in the Northern United States, and is considered by Gray as "truly indigenous," though this has been doubted by other botanists. It has been cultivated from a very early era, and may have escaped from cultivation in many places where now found wild. It is a hardy plant, with rough angular stem from 10 to 20 feet long, which climbs by twining around the stems of other plants. Its leaves are opposite, heart-shaped, 3 to 5 lobed. The flowers are diœcious, and non-petalous. The staminate flowers have 5 sepals and stamens, and grow in loose axillary panicles. The fertile flowers grow in short catkins of leafy scales, each with 2 flowers, the calyx of a single sepal embracing the ovary, which has a style with 2 stigmas. The plant has a perennial root, which sends up numerous annual stems. The fruit is a roundish ovoid nut, enclosed in the persistent calyx. The scales of the strobiles are covered at their base with an aromatic resinous substance called *lupulin*, which forms the commercially valuable product of the plant. It composes about $\frac{1}{16}$ the weight of the dried catkin.

Hops, showing Vine and Stem.

The hop is a common plant on the banks of streams in the Northern United States, and is very commonly cultivated in gardens for culinary purposes. For commercial purposes it is raised on sunny hill-slopes, a well-drained soil being necessary. It is subject to blights, and to a species of aphis which is sometimes very destructive. The plant is twined around poles, the vines being cut near the ground and the poles pulled up, in the harvest-season, and the strobiles gathered. These are dried in kilns, and bleached at the same time by the fumes of burning sulphur. They are packed for transport so tightly that they may be cut into blocks with a knife. In this state they will keep for years, if kept dry and well aired.

The value of hops is due to a bitter principle and a volatile oil in the *lupulin*, whose virtues are imparted to water and alcohol. They are used to flavor malt liquors, and also as a medicinal tonic. Their use gives a tonic effect to malt liquors, though this is modified by the alcohol and other ingredients. They are also credited with narcotic and sedative properties, though these are very slight.

Although the culture of the hop was begun in this country at an early period of colonial history, it did not become extensive until the present century. The hop has now become an agricultural product of great value, and is extended over most of the States. The main product is that of Western New York, where it is cultivated on a large scale. Wisconsin and California come next in importance, its commercial culture in the latter being of recent date. According to the census of 1880 the total hop-product of 1879 was 26,546,378 pounds, raised on 46,800 acres. Of this product New York is credited with 21,628,931 pounds, Wisconsin with 1,966,827 pounds, and California with 1,444,077 pounds. The export was 9,739,566 pounds, valued at $2,573,292. But the annual product greatly varies, and the exportation is sometimes replaced by a large importation, as the crop fails or is successful here and abroad. The hop-plant also yields a fibre similar to that of hemp, and is employed to some extent for this purpose. Ordinarily only the female plant is cultivated, it yielding sufficient male flowers for fertilization. The male plant is of little importance, and scarcely known except to botanists. (C. M.)

HORNE, RICHARD HENGIST (1803–1884), an English author, was born at London, Jan. 1, 1803. He was educated at the military college, Sandhurst, then entered the Mexican navy as a midshipman, and served till the close of the war of independence. He sailed to New York, visited Canada, and after a variety of adventures found his way back to England. Here he devoted himself to literature, and produced some tragedies founded on Elizabethan models, among which were *The Death of Marlowe*, *Cosmo de Medici*, and *Gregory VII.* His epic poem, *Orion* (1843), was sold on its first appearance at a farthing a copy, this ridiculous price being intended as a sarcasm on the public estimate of epic poetry. Then, following in the footsteps of Hazlitt, Horne published *A New Spirit of the Age* (1846), being criticisms on living British authors. Next came *Spirit of Peers and People* (1846), then *The Poor Artist* (1850), and other books. In 1852 Horne went to the gold-fields of Australia in company with William Howitt. There he became chief of police, commissioner of the gold-fields, mining registrar, and held other offices. He published *Australian Facts and Principles* (1859). Returning to England in 1859 he again contributed frequently to periodicals, and in 1874 a pension from the civil list was awarded to him by Lord Beaconsfield. His latest works were *Bible Tragedies* (1881) and *Sithron, the Star-stricken* (1883). In his old age he lost his sight entirely. He died at Margate, England, March 13, 1884.

SeeVol.XII. p. 176 Am. ed. (p. 172 Edin. ed.).

HORSE. Of the genus *Equus*, of large, herbivorous mammalia, to which the horse belongs, there are at present known seven species, and several varieties which some writers have classed as species. Of this genus the most marked anatomical peculiarity is the character of the foot. This consists of a single developed toe, two of the others being completely and two very nearly aborted. The animal walks on the nail of this toe, which has become a large, tough, horny hoof. As an organ of swift movement the foot of the equine genus has no equal in the limbs of any other inhabitant of the hard, level plains which form its native habitat.

The horse differs from the asses and zebras in having the long hairs of its tail developed over the whole surface, in its longer mane, shorter ears, longer limbs, and smaller head. It also has a small bare callosity on both fore and hindlegs, while the asses and zebras have this mark only on the forelegs. In Thibet, which is the home of the variety of the ass which most nearly approaches the horse, there has been recently discovered a new species of *Equus*, which is closely related to the horse, since it has the warts on its hindlegs, and the broad hoofs of the horse. It differs from the horse, and approaches the ass in the long hairs of the tail being confined to its lower half. The mane is short and erect, and there is no forelock. It is of small stature, with thick and strong legs, a large and heavy head, and ears smaller than those of the ass. This species, discovered in 1881 by the traveller Przevalsky, has been named *E. Przevalsky*. It inhabits the Dsungarian Desert, between the Altai and Tianshan Mountains; is very active, shy, and difficult to approach, and seems able to do without water for long periods, so that it can only be hunted in the winter, when melted snow can be obtained by the hunters.

No description of the general form and size of the domestic horse is here requisite, these particulars being familiar to all readers. We need simply say that it varies very considerably in size in different localities, partly as a result of selection and partly through the influence of climate. Between the small breeds of Canada and the Shetland Islands, which are apparently stunted by extreme cold, and the huge draught-horses of the Flemish and other stocks, the difference is almost as marked as that between the larger and smaller varieties of the dog. In form also there is as marked a difference between the slender-limbed and clean-cut bodies of racers and the elephantine proportions of draught-horses, with their sturdy limbs and solid frames. All this, however, is mainly the result of selection, and has no bearing on the characteristics of the horse as a species.

The domestic horse is probably native to Europe, Asia, and Northern Africa. Its exact habitat, however, cannot be positively ascertained, as all existing wild herds may have escaped from domestication. We know that it was abundant in a wild state in early Europe, and was apparently used as food by the inhabitants, to judge from the condition of the remains found. The horse also formerly existed in great abundance in America, as is proved by its fossil remains, found almost throughout the whole extent of that continent. In fact, if we might judge from geological evidence, America has truer claims than Europe or Asia to be the native home of the horse. A highly interesting series of fossil animals has been recently exhumed in the Western Territories, in which nearly every step of development from an original five-toed to the existing one-toed animal can be traced. The size also gradually increases from an animal little larger than a fox to the noble proportions of the existing horse. Various other changes have taken place: in the number and position of the teeth, the form of the limbs, and other anatomical points which we cannot particularize. In Europe some members of this fossil series have been found, but the complete and direct series is as yet confined to America.

It is somewhat singular that an animal so capable of self-preservation as the horse, which evolved through long ages from an original five-toed animal on this continent, and long survived here in a form not anatomically distinct from the horse of Europe, should have utterly disappeared. That our climate and conditions are still suitable to it is proved by its rapid multiplication in a wild state when brought here by the Spaniards, and it is a puzzling geological problem to understand what causes could have annihilated such a species throughout the whole length of the American continent. A doubtful theory has been recently advanced, to the effect that the horse was not extinct on this continent when first visited by Europeans. One of the first navigators who visited the coast of Buenos Ayres speaks of horses among the animals seen there. The date was anterior to that of the invasion of Peru by the Spaniards, and too early for any escaped Spanish horse to have possibly reached this locality. The mention, however, is too vague and indefinite to serve as a basis for any conclusion, and while it is not impossible that the horse may have survived in the region of the pampas, it is, for various reasons, exceedingly improbable.

The Spaniards introduced the horse into this continent not long after the discovery of America. In addition to those brought over by Spanish cavaliers, and used by them in the conquest of Mexico and Peru, some of which may have escaped, there is mention of several shipments of horses from Spain to America. Azara remarks that a few were introduced into America in 1535, and that several were shipped to Paraguay in 1537. These seem to have been the origin of the vast herds of wild horses now found on the South American plains, where the conditions of nature appear to have highly favored their increase. These extensive plains, so widely spread through the territory of the Argentine Republic, are now the habitat of myriads of wild horses. Herds containing several thousand each may be there met, each led by a master stallion, whom the others obey. These wild horses greatly resemble their Spanish ancestors in shape. They have fair but not high speed and great powers of endurance.

North America has also its herds of wild horses, which exist abundantly in Mexico and northward. Those of Mexico, California, and Texas are known as *Mustangs*, and are probably of Spanish stock. These are small but spirited horses, of good speed and endurance. The wild horse of the prairie region of the north and north-west is known as the "Indian Pony." It is impossible to ascertain its source. It may have been derived from the mustang, with a probable mixture of northern blood. It is very small, being seldom or never over 13 hands high, so that its rider's feet nearly touch the ground. Yet it is strongly built in body and legs, and has great strength and activity, so that it carries its rider with ease. It has a high crest, a flowing tail and mane, and a proud carriage of the head. Many of these horses have been brought into use in Canada. The other portions of the earth where the wild horse abounds are the plains of Central Asia and Siberia, of interior Africa, and of Australia, where it has multiplied abundantly. Its powers of increase and self-preservation are so great on dry, level, grassy plains, that its extinction in America is a very remarkable phenomenon.

The horse has been domesticated since a very early period. It is specially fitted by its compact, close-knit frame, its muscular limbs, easy and rapid stride, and general structure and habits, for the use of man, both in draught and carriage, and its powers were early availed of. Rude tribes have used its flesh for food, and with the modern Tartars it is the most highly esteemed of all animal food. The Tartars also use its milk, which they make into an intoxicating beverage called *Koumiss*. But among civilized peoples, as a rule, it is used only for labor and carriage, for both of which it is so well adapted.

Of the domestic horse, the most celebrated race is that of Arabia, which has now spread throughout the Mohammedan world. It is plentiful in Turkey and in Barbary, where it is specially known as the *Barb*. This breed is of beautiful form, having fine legs and feet, small heads, and small, shapely bodies, usually not over 15 hands high. This horse, as Strabo asserts, did not flourish in Arabia in his time, about the beginning of the Christian era. If so, it has been remarkably developed since, attaining a wonderful agility, tractability, lightness, and endurance. Of the other well-marked races may be named the Flanders horse, a large-bodied, heavy, coarse-legged, slow-moving animal, the basis of the modern draught-horse ; and the Tartar horse, a small, bony, rough animal, with shaggy mane and tail, large head, and great endurance. The characteristics of this horse seem to repeat those of the wild horse of Neolithic Europe, and it may be the most direct representative of the original stock.

The best modern horses of Europe and America quite possibly came from mixtures of these three breeds. The Barbs of Barbary, introduced into Spain and Italy, seem there to have met the Tartar horse, which had spread westward through Russia and Hungary, and the Flanders horse, which had extended southward. From various crosses of these breeds, and perhaps of others, we have the many valuable stocks of modern horses, from the thoroughbred racers to the huge and vigorous modern draught-horses. Several importations of Arabians to England were made between 1600 and 1700, and numerous ones after 1700. It is to the tempering of the original English stock by this fine foreign strain that the modern English racer, and its American descendant, are due ; horses which surpass their Eastern relatives in speed, strength, and endurance, as has been proved by tests of English racers with fine-blooded Arabians.

The English thoroughbred surpasses all other horses in beauty and speed. By the title thoroughbred is meant a horse whose ancestry for five generations is recorded in the Stud Book—a record of racers instituted about the beginning of this century, but which gives pedigrees dating back to 1700, and complete ones from about 1759. Of the other varieties of English horses, which, however, are not special breeds, may be named the hunter, the hack- or saddle-horse, the troop-horse or charger, the carriage-horse, and the cart-horse, which, in the London dray-horse, has become a huge animal of enormous strength.

The importation of horses of fine breed into the United States began early in colonial history, and races took place in Maryland and Virginia by the middle of the seventeenth century. The first recorded importation of an English thoroughbred was a horse called Bully Rock, a son of the Darby Arabian, brought over in 1730. The first imported thoroughbred mare was Bonny Lass, a granddaughter of the same Arabian, brought over about 1740. From that time forward the importation of thoroughbreds increased, and became common after the Revolutionary period. Of these importations of prime horses a list of some 300 might be given, among them several winners of the Derby. Through this means the original American stock was greatly improved. Though these and their descendants were kept principally for racing purposes, yet the cross with imported blood has improved horses kept for all purposes. The American racer as a rule is stouter and stronger than his English representative, through the custom of longer races in this country.

Of the importations of thoroughbred stallions the most important was that of Messenger. This noted horse was foaled in 1780 and imported in 1788. He died in 1808. He stood for many years in New York and in the vicinity of Philadelphia, and the best horses of the neighboring States have more or less traces of his blood. Among his noted descendants may be named the stallions Potomac, Hambletonian, Bay Figure, Engineer, Mambrino, Tippo Saib, and in particular his unsurpassed grandson, American Eclipse. Importations of Arabians have also been made, but the experience of the United States favors the best English blood in preference. We have had but one Arabian of capital excellence. This was the white barb Ranger, which reached here as the result of an accident some time before 1770, and became the parent of much fine stock. No other of the many imported Arabians has left descendants of special reputation. The improvement of the horse in this country has not been a matter of definite record until recently, the American Stud Book beginning at a much later date than that of the English. Yet improvement has been going on for considerably more than a century, till now we have a race of horses which equal those of any other country for draught, road, or saddle. The preference of horses to oxen for farm-work before the Revolution led to greater rapidity of operation and the use of lighter machinery, and has had a beneficial effect on all our agricultural operations. As for the number of horses in use in this country, it was supposed that it would be greatly decreased by the wide-spread introduction of railroads, and the consequent disuse of horse-power. Yet such has not been the result, but horses have increased in number, being needed for increased farming operations and goods transportation.

None of the foreign breeds seem to have taken root in this country, unless, as many claim, the Canadian horse is a stunted representative of the Norman. This horse is small, generally 14 to 14½ hands high. It is remarkably hardy, and has good temper and great endurance. It has admirable legs and feet, full and broad breast, strong shoulders, a lofty crest, with mane and tail abundant and of wavy habit. It is not high in speed, yet adds speed to its other good qualities when crossed with thoroughbred stock.

Another noted American breed is the Morgan of Vermont. These horses are claimed to have originated in an animal of doubtful pedigree, owned by Justin Morgan, a Vermont schoolmaster, about the beginning of this century. Some claim that a race of such horses existed at that period, made up of crosses between the English thoroughbred and the Canadian. However that may be, the special ancestor of the Morgan stock was not remarkably fast, yet he has given origin to some excellent trotters, among them Black Hawk, Ethan Allen, American Eagle, and a host of others. The Morgan horses are undoubtedly a fine race, spirited, docile, hardy, with an easy, rapid trot, and most excellent as roadsters. They have thick and long manes and tails, with considerable curl in both. They seldom exceed 15 hands high, and have few of the marks of thoroughbred blood.

Another American stock, once highly esteemed, but now nearly or quite extinct, is the Narraganset pacer. This beautiful breed seems to have descended from a Spanish horse, probably of Barb ancestry, introduced into New England from Andalusia by Gov. Robinson. The breed was long kept up to supply a demand from Cuba, but has been allowed to die out since the cessation of this demand. They were natural pacers, of good size, and of remarkably easy motion as compared with modern pacers. They had great reputation for spirit, endurance, and speed. No pure descendant of the race is now known.

In the extreme South and West the favorite horse is of Spanish origin, a descendant of the domesticated breed of Mexico, Louisiana, and Florida. These horses are diversified in character, and generally of medium size and merit. Another breed of marked individuality is a race of partly wild horses on the seaboard islands of Maryland and Virginia, where they have existed since long before the Revolution. These, called beach horses, run wild through the year, and are never fed. They are very diminutive in size, yet often of perfect symmetry and great powers of action and endurance. They are said to be able to trot fifteen miles in an hour. They probably are descendants of animals escaped from the racing stock which has, from early colonial times, been kept up in Virginia, Kentucky, and the South generally.

Of draught-horses the only peculiar American breed is that known as the Conestoga, from its being produced in the valley of Conestoga, Pa. It is a very large and muscular horse, often of 17 hands and upwards in height, and closely resembles the heaviest breed of German and Flemish cart-horses. No record of its origin is kept, but its ancestors may have been brought over by the early German settlers of this region, or selected by them from native stock. It closely resembles the London dray-horse, having similar heavy outline of body with comparatively light limbs, but is not buried under a similar mountain of flesh. In color it follows the Flemish horse, except that black is more rare, and bay, brown, and iron-gray colors predominate. These animals, which have grown somewhat scarce of late, are used chiefly for wagons, and though of slow motion are quicker and lighter than their weight promises.

Nearly all the recent valuable varieties of European draught-horses have been introduced into this country, with considerable improvement to the older stock. This old draught-stock is largely made up of the English cart-horse, which was long since introduced into this country. There have been, recently, new importations of the same breed, and also of the Clydesdale horse of Scotland. Of other importations from England may be mentioned the Cleveland Bay, a large and showy coach-horse, much esteemed in England. The more notable of recent introductions are several improved breeds of French stock. The old Norman has been succeeded by the modern Norman, an animal of much power and endurance, with thick head, short, heavy neck, large breast and shoulders, and strong limbs, with much wavy mane, tail, and fetlocks. A valuable variety of this stock is the Percheron, now very much esteemed among our horse-fanciers. This animal perhaps springs from a tempering of the Norman blood with Andalusian stock. It is rather smaller than the Norman, and a quicker stepper, and is used in France as a *diligence* horse. It is the basis of the large iron-gray stock used in express wagons in our cities. From a mingling of these various breeds we may look for a great improvement in our future draught-horses.

Of distinctive breeds of American horses, however, the most marked and notable is the trotter, an animal whose special gait has been developed in this country to an extent not equalled elsewhere in the world. The trotter, indeed, is everywhere acknowledged as peculiarly of American origin, and its superior qualities conceded. The early gait of our racers was the run, like that of their English ancestors, the trot being of comparatively recent introduction. Racing was early indulged in at the South. About the beginning of the present century New York and other Northern States joined in the same amusement. But it has fallen into decadence since the middle of the century, being replaced by trotting, which has become the fever of the American turf. Racing, however, has not quite died out, and American runners have recently beat the best English thoroughbreds on their own soil. Mr. F. A. Walker, the late superintendent of the Census, says: "Receiving the running horse from England, we have so improved the strain that, in spite of disadvantages (recently), the honors of the British turf have been gathered in a degree almost unprecedented in the history of British racing by three American horses; and while Iroquois was winning his unprecedented series of victories, two, if not three, American three-year-olds, generally believed to be better than Iroquois, were contesting the supremacy at home."

We may further quote from the same article. "The trotting horse we have created, certainly the most useful variety of the equine species, and we have improved that variety in a degree unprecedented, I believe, in natural history. Two generations ago the trotting of a horse in 2 minutes and 40 seconds was so rare as to give rise to a proverbial phrase signifying something extraordinary. It is now a common occurrence. 'But a few years ago,' wrote Prof. Brewer in 1876, 'the speed of a mile in 2.30 was unheard of; now perhaps five or six hundred horses are known to have trotted a mile in that time.' The number is today perhaps nearer 1000 than 500. Steadily onward have American horses pressed the limit of mile-speed till, within the last three seasons, the amazing figures 2.10 have been reached by one trotter and closely approached by another."

We may here say that since 1879, the date of the article quoted from, the record of 2.08¾ has been made by Maud S., and a half-mile record of 1.03½. It is confidently predicted by trainers that the limit of trotting speed will yet be brought down to 2 minutes. In regard to other gaits it may be here remarked that the best pacing record, a faster gait than the trot, is 2.06¼ in harness, and 2.01¾ with running mate; and the best running record of American horses 1.39¾.

Many consider the American trotter a distinct strain or breed of horses. It is more probably a result of constant practice on suitable roads, since good trotters have come from several distinct stocks, as the Canadian, the Morgan, the Indian Pony, and the thoroughbred. Yet it is certain we have developed a variety of the horse not found in like perfection elsewhere. No English thoroughbred could venture to compete as trotters with many American horses of very low record, yet the root of our trotting stock cannot be traced to the English Stud Book or to Arabian ancestry, but seems of home make. Dutchman, one of our best trotters, was taken out of a clay-yard, and put on the turf from a Pennsylvania wagon team. The American trotter is simply a remarkable instance of the effect of keeping an animal to one kind of work, and breeding from the best specimens.

In the early part of our racing history three- and four-mile heats were the American fashion, and longer heats were occasionally made. This has had the effect to add to the strength and endurance of American horses, as compared with the English racer, with his short bursts of a mile or less. More recently the length of races has been reduced, and mile heats, best three out of five, are the prevalent fashion. The trotting horse is less delicate in form and needs less training than the high-bred racer, and is of superior value to the latter in that his gait is adapted to ordinary road driving.

The number of horses on farms in the United States, according to the census of 1880, is 10,357,488. Of these Illinois is credited with 1,023,082; Texas with 805,606; Iowa, 792,322; Ohio, 736,478; Missouri, 667,776; New York, 610,358; Indiana, 581,444; Pennsylvania, 533,587; and the other States in diminishing proportions. (C. M.)

HORSE-SHOEING. All the standard authorities in farriery admit that the bane of the shod hoof is too often a crippled foot. Despite all empirical science these authorities further admit that hoof maladies would be largely avoided and obviated if the horse's hoof was unpared and unrasped, and he could travel without excessive wear of the horn on hard roads without shoes. But in the domesticated state these conditions are impracticable. Just in proportion as the draught burden he is compelled to overcome is increased beyond his own weight, or his gait is quickened beyond his voluntary speed, his unshod hoofs break and wear away more rapidly than they are renewed by recuperative growth. In consequence they become so tender and sore that the average horse, in daily use upon hard roads, is rendered a more confirmed cripple than when his feet are subjected to iron shoes. So that, by universal consent, horse-shoes are accepted as an absolute necessity just as certainly as paring the hoof and nailing on iron plates cause the many ailments of the feet and limbs to which the domesticated horse is subject. This is a full and fair statement of the dilemma presented by the present advanced stage of farriery.

Now, whether these foot and limb diseases arise mainly from improper dressing of the hoof, or whether they are more directly caused by its being confined to the iron band, called the shoe, or whether the formation of the different patterns of shoes place the position of the foot and the bearings upon the iron contrary to the mechanical action of the foot and limb, is the complex question that has divided the various systems of farriery which have obtained in Italy, Germany, France, England, and America.

These diverse systems can be grouped into two comprehensive classes, namely: 1. Those who agree with the great French farrier, La Fosse, and his greater English disciple, Fleming, and his American follower, Goodenough, that the frog is the main weight-bearer in connection with the wall, and should, therefore, be placed squarely and firmly upon the ground; and 2. Those who contend with the great Italian farrier, Fiaschi, and the greater English professor, Gamgee, and the still more original Roberge and Bonner of America, that the frog is not a primary weight-bearer, and, therefore, should not be placed upon the ground on a level with the inferior surface of the shoe at the heels.

Modern horse-shoeing, therefore, admits that the science of the whole subject revolves upon these two problems: 1. How must the hoof be dressed so as to bring those portions of its inferior surface upon the shoe and the ground that nature designed to be the primary weight-bearers? 2. How must the shoe be fashioned and applied so as to place the weight only upon those portions of the hoof that should bear the pressure and the primary concussion, and thus insure the perfect articulation of the foot and limb? Upon the correct solution of these vital propositions depend not only the soundness of the horse's foot but the true progress of modern farriery.

The only true starting-point in the investigation has been an exhaustive examination of the unpared, unrasped, unshod hoof. The feet of colts, in the various stages of development, from foals to matured horses, have been carefully noted. When they have never been rasped, or pared, or shod, but have been subjected to severe friction, they have been accepted as the correct means of ascertaining the primary evidence of the weight-bearing portions of the hoof. This has reference only to the average sound, normal hoof. Any variations from this form are abnormal, and not only are unsuited as the bases of scientific deductions, but require peculiar treatment both in paring and shoeing.

The normal hoof that has never been shod or pared invariably shows that the wall grows down lower than the sole and the frog; much lower than the sole, not so much lower than the frog. The colt's foot always furnishes this testimony when it is perfect and subjected to the wear of an ordinary pasture. To insure a perfect foot he must range over upland pastures. Then his hoof is dense, tough, though comparatively small. It is marked with quite a downward growth at the heels, a less active growth at the quarters, and a much more rapid growth at the toes. The upturned hoof plainly reveals the facts that the wall at the heels on landing bears the weight, and on springing from the ground the wall at the toes performs the same function at every footstep. The quarters are elevated above the pressure, just as the hollow of the human foot is arched above the ground. When the horse is confined to low, marshy grounds, on the contrary, the hoof becomes softer, more spongy, wider, and weaker, with the entire bottom surface, embracing the wall, sole, and frog, upon the ground. Such a hoof is called a flat foot. When shod it is liable to have a "drop sole" and to such soreness that it is predisposed to many foot maladies. It is universally dreaded by farriers and generally discarded by intelligent horsemen. The colt's foot, raised upon an upland pasture, is, therefore, accepted as the only sound, healthy, normal foot. Upon the intelligent observation of its laws of growth, pressure, and mechanical action is based the advancement of modern horse-shoeing.

It plainly reveals that the wall to its termination at the anterior points of the bars is the only primary weight-bearer. When the foot is sound and healthy its action is a beautiful illustration of the perfect adaptation of means to ends, for the limitation of the primary pressure upon the inferior surface of the wall is in exact accord with the revelations of the mechanical action of its internal structure.

To illustrate: The terminal bone of the limb and foot, called the coffin-bone, because it is encased by the hard wall, is semilunar in shape in front. It is supplied with two posterior arms, reaching downwards and backwards, beyond the centre of the quarters, called the wings. To this coffin-bone are attached the extensor tendon in front, and the flexor tendon behind. These flex the foot, the latter drawing it back and elevating it, while the former throws it forward, thus completing the revolution of every footstep. This coffin-bone is furnished, on its superior surface, with striated, longitudinal ridges of bone, to which are attached cartilaginous leaves, exceedingly tenacious, yet moderately expansive. The inner surface of the encasing wall is likewise furnished with leaves, made of horn, that perfectly dovetail into the cartilaginous leaves of the coffin-bone. These two sets of leaves are called the sensitive and insensitive laminæ. Their union is so strong that the entire weight of the horse is thereupon suspended. This was the first important discovery of modern farriery. It was proven by the great Dr. Coleman, leading professor of the Royal Veterinary College of London, as early as 1799. His demonstration was complete. He removed the entire bottom of a horse's front feet—sole, bars, and frog—and then walked and trotted him, and even caused him to kick, with both hind feet in the air, so that the entire weight was violently concentrated upon the front feet; yet the internal structure did not descend to the least perceptible degree.

The union of the sensitive and insensitive laminæ was, therefore, admitted by modern farriery to be the means by which the superincumbent weight was sustained. The wall, therefore, was accepted by advanced horse-shoers as the primary weight-bearer. Its excessive growth at the heels and toes was accepted as evidence that the greatest wear and friction and pressure were concentrated at these two points at every footfall. These two conclusions mark the first practical step in the advancement of modern farriery.

They led to further important deductions upon a more intelligent examination of the colt's foot from this advanced standpoint. From the inspection of many feet it was found that the frog is located nearer to the ground than the sole. Moreover the frog is more spongy in texture, and much more expansive when subjected to pressure. It is very delicately connected with the sole by thin grooves of horn, called the commissures. In the colt's foot these semi-translucent commissures are so thin that, in the live state, as well as in the green specimen, the hoof can be expanded by the thumbs and fingers when applied to forcing them apart at the bulbs of the heels. It was thereby discovered that there is a natural expansion of the hoof, at the heels, when subjected to ground pressure, followed by a contraction to the normal dimensions when the hoof is lifted and freed from pressure. When these commissures, on the contrary, grow thick and firm, the natural elasticity of the hoof is materially lessened, and in extreme cases completely destroyed.

Modern farriery then began to investigate the connection between this lateral expansion of the hoof, when subjected to pressure, and the suspension of the weight by the sensitive and insensitive laminæ, and the slight elevation of the frog above the ground surface of the wall. The result was a marvellous discovery. The sensitive laminæ were subjected to extreme pressure in the green foot, and found to have an elasticity equal to at least ¼ inch. The object of this elasticity became manifest. It has been estimated that, in the case of a horse weighing 1000 pounds, the pressure upon the bottom of each one of his front feet, when trotting, at the rate of 2 minutes and 40 seconds to the mile, is equal to 1000 pounds to the square inch. In order, therefore, to break the force of this tremendous concussion, the superincumbent weight was not only suspended to the sensitive and insensitive laminæ, but they were provided with an elasticity to break the force of every blow caused by each footstep, especially in rapid motion. There are 700 of these sensitive laminæ, each one being provided with an elasticity equal to ¼ inch of elongation, both laterally and longitudinally. The aggregate elasticity of these sensitive laminæ, therefore, amounts to 700 quarters of an inch, or to 175 inches when reduced to a single lamina. These 700 springs evince the wonderful design of nature to break the force of concussion resulting from every footfall. But these provisions of nature do not end with the action of the laminæ. The lateral expansion of the hoof, at the heels, when the foot is placed upon the ground, is still another means of breaking the concussion. This lateral expansion coöperates with the elasticity of the sensitive laminæ to destroy the tremendous force of every step upon the ground. It amounts to at least ¼ inch at each heel, lessening towards the toes, where it is not requisite. Now, it is a well-established law of mechanics that the sole must descend just one-half the distance of the lateral expansion of the wall at the heels. This descent of the sole, aggregating ¼ inch at both heels, is sufficient to enable the slightly elevated frog to come in contact with the ground. There was revealed to modern farriery the complicated yet beautiful mechanical action of the foot to break the concussion at every footfall. Nothing could be devised more effective, more enduring, more complete. It worked a revolution in discarding the ingenious devices of man to soften the hoof and to break the force of each footstep. The wall should not be made soft by lotions, or poultices, or wet swabs, simply because these laminæ require firm supports on the sides of both the wall and the coffin-bone, just as the full action of springs require the unyielding attachments of the axle and the bed of the vehicle. No leather, or rubber, or sponge, or felt, or any other intervening cushion should be placed between the shoe and bottom of the foot. For, in addition to the fact that the foot should not be exposed to these dampened and decaying substances, but requires cleanliness and exposure as the conditions of vigorous health, the elasticity and expansion of the foot so far transcend those afforded by these meagre pads that they are entirely unnecessary. This mechanical action of the foot to destroy concussion can be epitomized in the following resumé: The wall is the primary weight-bearer. The sensitive and insensitive laminæ, by suspending the bones of the foot and limb to the wall, in connection with their elasticity, mainly destroy the concussion of every footfall. The expansion of the wall at the heels operates as a secondary means of dissipating the concussion. If any jar still remains, then the descent of the sole enables the frog to rest upon the ground, and its yielding, spongy texture destroys the last vestige of concussion, so that none can be transmitted into the sensitive regions of the navicular joint; for the slightest abrasion of the surface of the navicular bone, resulting from concussion, produces that hitherto incurable lameness called navicular thritis.

These discoveries belong exclusively to the triumphs of modern farriery, and they furnish the only correct data for properly paring and shoeing both the normal and the abnormal hoof.

1. The first absolute condition for the perfect mechanical action of the foot is that the wall shall be perfectly level. By this term is meant that the heels should measure the same distance from the ground surface to the coronet, where the hair and hoof unite. Then, at equidistant points, on the ground surface of the wall, from the heels, the quarters should measure the same height from the ground to the coronet. Then the wall, around the forward arches of the toe, should measure, at corresponding points, the same from the ground surface to the coronet. Then, and only then, will the foot measurements be mathematically level, and the action will be comfortable and perfect. For then will the hoof land squarely upon even heels, revolve evenly over equal quarters, and spring straight and true from the toes. This precision of action alone insures the correct descent of the coffin-bone between the equally taxed springs of the sensitive laminæ on either side of the wall, the perfect articulation of all the joints of the foot and limb in their journals, and that full, free, straightforward movement of the foot and limb, without either twisting or turning, that prevents strains, and ruptures, and ankle-cuffing, and tendon-striking, and knee-banging in the vast majority of horses.

2. The hoof must be balanced. By this term is meant that the heels and quarters should be equidistant, at corresponding points of the frog, which is the centre line or axis of the ground surface of the foot. Balancing the foot prevents undue weight on either side, and, therefore, enables the tendons to carry the hoof straight, both in elevating it from the ground and carrying it out straight and true without the least interference with the companion foot and limb. Moreover it equally distributes the pressure by equalizing the sections of the foot on either side of the frog, and, therefore, materially assists the sensible laminæ in the perfect performance of their functions.

3. The wall must be pared with reference to the proper length of the toe and the correct height of the heels. Modern farriery has detected the fact that the vast majority of foot-maladies resulting from horseshoeing must be attributed to an uneven and an unbalanced wall, in connection with the undue height of the heels and the excessive length of the toes. If the heels are permitted to grow too high, then the preponderance of weight is thrown forward upon the bone structure of the limbs. Moreover the bones of the feet are forced forward against the wall in front. Inflammation in the feet and soreness in the joints and bones speedily follow, which the ignorant smith generally mistakes for shoulder lameness. If the toes, on the contrary, are allowed to grow too long, then the preponderance of weight is thrown upon the flexor tendons, which excites acute inflammation in them, and in extreme cases produces a rupture of the sheath that binds them to the cannon-bone, resulting in an incurable "let down." The foot must be pared so that the weight is equally distributed between the tendons and the bones, and then no undue strain can be forced upon either part. When one heel is permitted to grow higher than the other, bruises in the high heel, called corns, invariably result. When the toe grows too long, then the toe of the coffin-bone is unduly elevated, and the wings of the coffin-bone, at their inferior points, are forced down upon the fleshy floor of the foot, and extravasation of the minute blood-vessels that cover the sensible floor of the foot occurs, thereby producing bruises and blood-spots by seepage through the porous sole at both heels in the angle formed by the wall and the bars, ordinarily called corns.

It has been discovered, quite recently, that the proper height of the heels and length of the toes can be determined only by the inclination of the pastern-joints. No arbitrary law, such as an inclination of 45 degrees, insisted upon by the older authorities, can be laid down. This can be made plainly manifest from the mechanical conditions present. The weight in the front limb, for instance, descends perpendicularly from the carcass to the ankle. At that point it is deflected. According to the law of the resolution of forces, one-half of the force continues in the perpendicular line to the ground. The other half is deflected, and passes through the axis of the pastern-bones to the hoof. Now if the inclination of the axis of the hoof coincides with the inclination of the axis of the pasterns, then the force is transmitted, with the least possible injury or disturbance, in a direct line to the ground. But if the axis of the hoof does not coincide with the axis of the pasterns, then the force is again divided in the hoof, one-half passing to the ground in the line of the axis of the pasterns, and the other half being deflected in the line of the axis of the hoof. This division of the force in the hoof results in an unnatural jar or disturbance, to the manifest injury of its sensitive parts and interference with its mechanical action. Now if the inclination of the axis of the pasterns and that of the hoof coincide, then the deflected force from the ankle is transmitted in a direct line, without undue disturbance, from the ankle through the pastern-bones and the hoof to the ground. The heels, therefore, should be lowered and the toe foreshortened, having reference to the normal strength of the hoof to perform its functions, till the line of inclination or descent is continuous, measured in front of the pasterns and the wall, from the ankle to the ground. In paring the hoof, nothing is more important than the proper foreshortening of the toe with reference to the normal height of the heels. It means the full expansion of the hoof at the quarters, where the coffin-bone must have free play in the perfect articulation of the foot. It means the absence of contraction, thrush, corns, or the ossification of the lateral cartilages. It means perfect freedom from soreness of the flexor and extensor tendons, and it insures that springy action of colthood and that length of stride consonant with the shape of the carcass and the muscular capacity of the propelling powers.

4. *Paring the Sole and Frog.*—Herein, till quite recently, the teachings of farriery were in inextricable confusion. The older authorities insisted that the sole should be pared till it yielded to the pressure of the thumb, in order to insure the elasticity of the hoof. This was directed without reference to the shape or condition of the hoof. Mayhew may be mentioned as the head of this school of farriers. More recent masters, like Mr. George Fleming, insist that neither the sole nor the frog should ever be touched : that the frog is shed by nature at the proper seasons, and the sole exfoliates as it passes from the live to the dead state. However erroneous the latter position may be, very few authorities advise paring the frog unless it may be to remove its ragged edges. But it has been recently demonstrated that the sole is much more liable to abnormal growths. It is dominated by the wall, and answers to its encroachments or recessions. If the wall contracts, the sole becomes cramped and grows too thick. If the wall is wide-spread, as in flat foot, the sole becomes exceedingly thin. Its natural thickness varies from ¼ to ⅜ inch. It sometimes becomes abnormal and grows an inch thick. This is always due to the encroachments of the wall. If the wall wires in at the heels, the sole will inevitably become thickened at the heels and quarters. If the wall becomes unduly rounded at the toe, bending under and backwards, then the sole around the forward arch of the toe will invariably become abnormally thick. The result is exceedingly destructive. Undue thickness of the sole cramps the mechanical action of the bones of the hoof, and often excites an active local inflammation that produces waste or atrophy of adjacent parts. When the narrowed quarters or the rounded, bent-under wall at the toes are present, the sole must be pared to its usual thickness, as it will never exfoliate to its normal condition. In all cases, except that of an unusually thin, weak wall, the sole should be pared so as to approximate to the concave form it preserves in colthood. In no instance should the sole press upon the shoe, except where the wall is so thin and weak as not to be able to bear the weight of the horse without pain. Then the sole, for hospital purposes only, should be so pared that its outer margin, where it joins to the wall, and about the thickness of the wall, should bear the weight equally with the wall. These are the generally accepted directions of advanced farriery for dressing normal feet.

5. *Preparation of Abnormal Feet for Shoeing.*—Abnormally shaped feet can generally be detected by the general contour of the wall and sole, as hereinbefore noted. But they can be more definitely determined by the direction of the bars. If the bars are parallel with the commissures, then the wall is neither unduly expanded nor contracted, but normal in width. If the bars turn inwardly and point sharply towards the commissures, then the wall is unduly contracted and the sole is correspondingly thickened. If, on the contrary, the bars point outwardly, then the wall is unduly expanded, the sole thin and excessively low and convex, and the condition of general weakness prevails. Abnormal feet may, therefore, be comprehensively grouped into contracted, flat, concave, and convex feet.

A. *Contracted Hoofs.*—These are either narrow at the quarters or drawn in at one or both heels. When narrow at the quarters the wall must be sharply foreshortened at the toe. Then the heels must be lowered and the bars pared down thin, while the sole must be concaved, care being taken to pare out the commissures so thin that the hoof can be expanded by the pressure of the thumbs and fingers at the heels. This method insures the free action of the hoof at every footfall, so that its own restored lateral movement will gradually expand the hoof to its normal dimensions, provided, always, the nails are driven in anterior to the middle of the quarters, and the toes are kept constantly foreshortened. When the contraction is only on one side, then the bar and commissure, on that side, should be pared out, and the contracted side during the treatment should be left slightly higher than the other side. When the heels are drawn, or wired in, then, in addition to the treatment above indicated, the knife should be drawn through the angle of the heels, and where they have grown abnormally high they should be sharply lowered, and both the heels and frog placed squarely upon the ground. When the wall is sunken on one side, generally at the forward arch of the foot, the wall of the full side should be slightly narrowed and thinned with the rasp, and the margin of the shoe set as full on the shrunken side as the hoof is required to expand. Gradually the shrunken side will expand to the full measure of the shoe.

B. *Flat Feet.*—These are as much too wide as the average of contracted feet are too narrow. Either too wide or too narrow means positive weakness and discomfort to the horse ; for the wall, allowing for its bell-shaped curves from the coronet to the ground surface, should be perpendicular in effect from the coronet to the ground, like the foundation of a house, and directly under the superstructure. Flat feet are always accompanied by a drop sole, which indicates that the sole has either become flat, or, in severe cases of founder, so convex, instead of being concave, that it receives the ground pressure before the wall takes the bearing. The wall in front then separates from the coffin-bone, and grows out to an extreme length. Frequently between the wall and the coffin-bone is a fungus growth, of partly honey-combed horn in structure, that often degenerates into "seedy toe." In such cases the wall, in front, must be rasped back, or foreshortened, until the excess of horn is removed. Then the wall must be pared down from the anterior points of the quarters to the extreme heels, but the sole, bars, and frog must be left intact, as the hoof is already too wide-spread, and consequently very weak. All pressure must be taken from the toe, and the nails must be driven into the wall at the quarters and heels. Then, at every shoeing, it will be found that the sole, in front of the point of the frog, can be gradually concaved, until it assumes the arched form of the normal sole ; because the coffin-bone has been changed from a comparatively upright position where it was pressing the sole downwards, and, by exciting inflammation, causing atrophy in both its own substance and the sole, to a more inclined normal position, that enables the sole to rise to its proper concavity, or arched-like shape.

C. *Convex Feet.*—By this term is meant that rounded form of the wall in front, from the coronet to the ground surface, which causes the wall to bend under at the anterior ground surface. This pressure forces the sole anterior to the point of the frog upwards. The sole thus grows to an undue thickness, which, in turn, forces the coffin-bone upwards at the toe, out of its position, so that only the upper portion of its journal articulates with the navicular and lower coronal bones. This partial articulation produces a short, painful step, that seriously cripples the action of the horse. The convex toe is always attended with an abnormally low heel. The result is the same in effect as if several toe-calkins had been welded upon the shoe, thus tilting the foot up, beyond its true level, and practically making the horse walk constantly up-hill, even on level ground. The treatment is as effective as it is simple. The sole, in front of the toe of the frog, must be severely pared as far back as the middle of the quarters, in the concave form, until it is quite thin. The wall, from the forward arch of the quarters, around the toe, must also be pared down, leaving the quarters and heels intact. The hoof should then be armed with a shoe, provided with oblong heel-calkins, and, to insure a more perfect articulation, two more oblong calkins should be placed on the inner margin of the web of the shoe at the forward arches of the quarters. These forward calkins should be made less in height than the posterior ones, and then the involuntary articulation of the foot is decidedly increased. The repetition of this treatment through four or five shoeings, at intervals of a month apart, will restore the hoof to its normal shape.

D. *Concave Feet.*—These are the reverse of the convex. The walls, in front, sink, or bend in, midway between the coronet and the lower edge, and then flare outward at the ground surface. They are sometimes called "sunken walls." They are always attended with abnormally high heels. The treatment must be the reverse of that indicated for convex feet. The heels must be severely lowered, the walls foreshortened and a plain shoe used, drawn to advantage, thinner at the heels than at the toes.

The most common foot maladies resulting from bad shoeing are thrush, quarter-crack, bruised heels, and sore toes. These come directly under the care of the smith, while quitter and grease heels are too complicated for the treatment of the average farrier, and should be relegated to the supervision of the veterinary surgeon. Both thrush and quarter-crack are the results of contraction of the wall, the the former being frequently attended with an unduly brittle wall, and the latter with an uncleanliness on the stable floor upon which the horse stands. Expansion of the wall will remedy both. The crevice of the quarter-crack must be cleaned out by the knife of the farrier, and its downward growth from the coronet checked by a lateral incision that separates the new growth from the fractured wall. The thrush must be kept clean and dry by frequent swabbings of the cleft of the frog. Local caustic applications, such as sulphate of zinc, must first be applied to check fungus growth, and then healing remedies, such as vaseline, must be used to heal it up from the bottom.

Bruised heels, other than corns, are produced either by permitting the shoes to remain on too long, thereby springing from the wall at the heels, and becoming embedded in the angle between the wall and bars, or by gravel or stone contusion. These will yield readily to poultice applications and rest. The shoe must be removed, and stoppings of flaxseed, applied warm, resorted to until the inflammation has subsided.

Sore toes are as numerous and even more painful than bruised heels. They are produced by the undue pressure of the shoe upon the wall, resulting from permitting the shoes to remain on too long and the toes to grow to an excessive length. The pressure is frequently so severe that a line of contused blood can be plainly seen between the wall and the sole all around the toe. The toe must be lowered and foreshortened, and the removal of pressure of the shoe around the toe is attended with immediate relief.

This epitome of modern horse-shoeing properly concludes with a review of the different patterns of recently devised horse-shoes. The older forms need only a cursory mention. These are "tips," which cover only the wall generally around the toes, and sometimes only one quarter in connection with the toe, leaving the posterior parts of the hoof bare upon the ground; the plain shoe, either with or without heel- and toe-calkins, that rests upon the wall from one heel around the toe to the other heel, generally flat upon the ground surface, and concaved from the wall so as to avoid sole pressure on the foot surface; and the bar shoe, that is provided with a bar of iron, extending across form one heel to the other, upon which the frog rests. All of these patterns, subject to numerous fanciful variations, have been advocated in turn as the very perfection of horse-shoes. They have been in constant use ever since their respective invention in Italy, France, and England centuries ago. They all have their uses. Under certain conditions differently shaped feet require their employment. The work-horse cannot overcome heavy draught burdens unless his feet are armed with heel- and toe-calkins. The horse afflicted with weak heels or quarter-cracks upon both the inside and outside quarters has been benefited by the use of tips if for light harness purposes, or the use of bar shoes if for draft purposes; while Prof. Gamgee insists that navicular thritis, even when accompanied with transverse fractures of the navicular bone, can be permanently cured, and the sections of the bone again firmly united, simply by the use of the ordinary shoe armed with heel-calkins.

But the newest patterns of horse-shoes are the Peri-planter of Charlier, the four-calkin of Mr. Robert Bonner, the rolling motion ball shoe of Dr. David Roberge, and the wing-heeled Centennial shoe of Mr. S. T. Harris.

The Peri-planter is based upon the theory that the entire base of the hoof-walls, bars, frog, and sole should come upon the ground at the same instant. It is a narrow rim of iron forged just as wide as the wall. The wall is cut away at its lower margin, in depth precisely equal to the thickness of this iron rim, which is neatly inserted in the groove thus made. Its design is simply to prevent the wear of the wall by contact with hard roads. If the frog and sole are primary weight-bearers with the wall and bars, then this shoe is practical, but actual test has demonstrated that it is as fanciful as it is an ingenious pattern.

The four-calkin shoe, invented by Mr. Robert Bonner, is one of the greatest improvements of modern farriery. It answers more completely on the front foot than the French rolling motion shoe in articulating the coffin-joint, and operates, on the hind feet, as a marvellous cure for spavin when the outside calkins are made higher than the inside ones. Two of the calkins, made oblong, are welded on to the web at the heels of a plain shoe, while the other two are placed at the inner edges of the forward arches of the quarters. Thus the flexor tendons are protected while the danger of slipping is prevented, and the articulation of the foot increased at the same time.

The rolling-ball shoe of Dr. David Roberge is another valuable hospital shoe. It is solid at the bottom, being round or convex in shape at the base. It corresponds to the ball-and-socket joints of the shoulder and hip. If there is anchylosis of any of the intermediate joints, or if there is any soreness in the joints, muscles, or tendons, the rolling-ball shoe, co-operating with the ball-and-socket joint, will enable the afflicted horse to revolve and ease the foot in such a position as will relieve the strain upon the injured part. Horses with stiff joints, that have been regarded as useless, have been enabled to do excellent service by the aid of this ingenious shoe.

The wing-heeled Centennial shoe follows the wall to the heels, and then turns with the inflexion of the wall and covers the bars. It is based upon the fact that the bar grows down to the level of the wall, and is a powerful agent both in preventing the wall from unduly expanding or contracting, and in assisting the wall to obviate slipping by preserving the effectual check presented by the angle at the heel formed by the wall and bar of the unshod hoof. The wings of this shoe, furthermore, preserve the division of pressure between the wall and bar at the heel just as do the uncovered wall and bar. It has been found to relieve horses with weak heels or quarter-cracks, and especially valuable for saddle-horses that have to bear, forehanded, the extra weight of the rider.

There are various other patterns, especially of rimmed shoes, some plain like the English blank, and some corrugated like the American form of Mr. Goodenough, but they present nothing novel either in theory or design. They are simply the productions of ingenious patentees, and have nothing new to offer as to the position or the weight-bearing portions of the hoof that have not already been recognized in the literature of farriery.

Two other requisites are now demanded by modern scientific horse-shoeing as necessary. One is the greatest possible lightness of the shoe consistent with the use of the horse, and the other is the smallest size and the least possible number of nails consistent with its secure fastening to the wall. The honor of first forcibly presenting these requisites belongs to the English farrier, William Miles. The greatest French hippopathologist, M. Boulèy, has demonstrated that an ounce of artificial weight at the foot is equal to a pound at the shoulder, and that a horse who carries on his four feet shoes weighing two pounds each, and walks four hours in his daily routine, is compelled to lift 114 pounds of extra weight upon his four feet. From this calculation may be realized the tremendous strain imposed upon the strength of the horse by reason of shoes of unnecessary weight. Besides it has been found that light shoes not only wear as long as heavy ones but they retain their position on the foot more tenaciously.

The nails, too, should be light, smooth, highly finished, hot-forged, and driven so as to have a short, thick, transverse hold, rather than extending high up, which splits the wall and crowds upon the sensitive internal structure. Heavy draught shoes can be retained on the feet by 7 nails instead of 9, which was the old practice, and 5 will answer for the shoes of saddle- and light-harness-horses.

Since modern farriery has recognized the important fact that the hoof grows unequally, in some instances more rapidly at the heels than at the toes, and the reverse, and in other instances more rapidly on one side than on the other, the necessity of more frequently dressing the feet and resetting the shoes has been acknowledged. Moreover, the cruel practice of overheating the shoe, and burning the hoof for a close fit, till the smithy is filled with the fumes of the destroyed horn, has been discarded as a serious injury to the texture of the horn. The shoe, in most cases, is now only slightly heated to destroy the inequalities between the wall and the shoe, and in many cases, where the shoe is carefully made and finished, it is perfectly fitted entirely cold. This humane practice is daily gaining public favor and authoritative sanction.

It will now be obvious to the general reader that modern farriery has made great advancement over the older practice and attainments of the Italian methods of horse-shoeing as set forth in the works of Fiaschi, and of the French methods as taught by La Fosse, and of the English rules as laid down by Prof. Coleman. (S. T. H.)

HOSACK, David (1769–1835), an American physician and naturalist, was born at New York, Aug. 31, 1769. He graduated at Princeton College in 1789, studied medicine, and received his degree of M. D. at the University of Pennsylvania in 1791. He then spent three years in further study in Europe, and returned with a large collection of plants and minerals. In 1795 he was made professor of botany in Columbia College, New York, and in 1797 professor of materia medica. In 1807 he became professor of materia medica and of midwifery in the College of Physicians and Surgeons then founded. In 1811 he became professor of the theory and practice of medicine in the same institution, and after its union with the medical school of Columbia College in 1813 retained his position. In 1826 Dr. Hosack, with the rest of the faculty, resigned, and took part in founding the Rutgers Medical School, which was closed in 1830. He also held many important professional positions, and was a fellow of the Royal Societies of London and Edinburgh. He established the Elgin Botanic Garden, and was one of the founders of the New York Historical Society, of which he was president (1820–28). His medical treatises, especially those on fevers and contagious disorders, long had a standard value. He died at New York, Dec. 23, 1835. Besides medical works he published memoirs of Dr. Hugh Williamson (1820) and of De Witt Clinton (1829).

HOSMER, Harriet G., an American sculptor, was born at Watertown, Mass., Oct. 9, 1830. As she was naturally of delicate constitution, her father, a physician, gave her rather a boy's training. At an early age she began modelling in clay, and after completing her school education studied anatomy at the Medical College of St. Louis. In 1852 she exhibited at Boston a marble bust, Hesper, and then, by the advice of Charlotte Cushman, her father placed her under the instruction of Gibson, the sculptor, at Rome. Here she produced busts of Daphne, Medusa, and Aenone, and for the Public Library of St. Louis the statue of Beatrice Cenci. She also made a bronze statue of Thomas H. Benton for that city. Her best-known works are Puck, a spirited conception (1855); Zenobia in Chains, a colossal statue (1859); The Sleeping Faun (1867); and The Pompeian Sentinel (1878). Her works show great power both in thought and execution.

See Vol. XII. p. 314 Am. ed. (p. 301 Edin. ed.).

HOSPITALS in the United States. With the increase of schools for medical education, the subject of clinical teaching has come to demand more and more largely the attention of the medical profession. Where such schools are located so as to avail themselves of the opportunity afforded by the public hospitals, this has been seized upon by the professors, and thus they have been enabled to teach their students by means of the bedside instruction thus presented. But, as schools multiplied in a city, other means became necessary, and hence medical colleges at first organized hospitals on a small scale, within their own buildings, or in close proximity thereto. These accommodations becoming inadequate, buildings were erected by each college for its own use. Thus, in Philadelphia there are the hospitals of the University of Pennsylvania, the Jefferson Medical College, the Women's Medical College, the Hahnemann Medical College, occupying large and stately structures, equipped with all the most recent appliances known to the profession. The same holds good in New York, where are the Bellevue Hospital, the Long Island Hospital, etc. In short, every medical college now organized in America is regarded as not fully prepared for its task as an instructor in medicine unless it has its own hospital, or has the right to teach its students in the wards of the public institution usually provided for the sick poor, etc. Special hospitals are also rapidly being erected, as for cancer, consumptives, diseases of the eye and ear, of the throat, of the skin, orthopædics, and recently there have been added hospitals for incurables and for convalescents. Hospitals, sometimes preferably called asylums for the insane, have long been a distinctive feature throughout the United States. It has been found that so many insane persons were kept without proper care or any form of treatment at their homes, or in prisons as criminal insane, or in almshouses, that recently a new impetus has been given to the erection of institutions for the care of the indigent insane. (See Insanity.)

Hospitals or asylums for inebriates have also been organized, and have met with greater or less success in relieving the intemperate of their diseased condition Similarly, hospitals for opium habitues, and those addicted to the use of other forms of narcotics, have been opened in many parts of the United States, but these are yet a subject of consideration as to how much value they have proved to be to the unfortunate victims of such degrading appetites. While it may be thought that the idea of hospitals for every form or phase of illness has run wild, but little attention has been given to one class, who perhaps demand it more earnestly than any other. But few institutions for the special care of sick children have been provided. It is of great importance that children when sick should at once be placed in the best possible condition for restoration to health. It is rarely advisable that they should be mixed up with adults, or those near puberty, as they too readily are indoctrinated with the follies and vices of their older associates, and this is particularly the case within the walls and surroundings of a hospital during the period of convalescence, when, for want of occupation, they are readily attracted by anything which promises amusement or employment.

Nor is this the only reason for such a separation. If the mortality of children in the ordinary hospitals is compared with that of a similar number, even of the poorest and least cared for elsewhere, it will be found that the excess of the former is frightful. Thus, at one time in a well-known and at one time infamously notorious hospital, the mortality was 100 per cent. of the foundlings that were brought under its roof. This has recently given origin to the organization of a hospital for foundlings, called The Sheltering Arms, in Philadelphia, where, even though under very unfavorable conditions, the mortality of the self-same class was reduced nearly to 31 per cent.

In New York similar hospitals have been organized, and have met with equal and even better results. In this connection it may be added that the United States yet lacks hospitals which will care for the infant children of mothers, widows, or it may be worse, who are compelled to labor hard all day for the poorest pittance, and who are often tempted in their sore need to desert the child or even take its life, and thus be free of what is purely a burden to them.

The subject of the proper training of nurses has recently largely occupied the minds of sanitarians. Training schools have been organized in connection with a number of the larger American hospitals, particularly in the cities of Philadelphia and New York. Good results have followed this agitation, as shown by the largely diminished mortality of the hospitals which have enjoyed the advantage of these trained nurses, and of the improved methods of ventilation, sewerage, and general construction.

An additional point has lately been brought into prominence in connection with hospitals—that is, the dispensary service. Recently it has become a fixed fact that there are few hospitals, save those in the country and those devoted to special treatment, as for insanity, intemperance, and the like, which have not a dispensary department, where the sick poor are enabled to apply for and receive medical advice and medicine free, for such cases as are still able to be brought away from their homes. In many large cities, indeed, this department completely overshadows the real hospital work, and the whole time of the hospital staff is devoted to the care of these walking cases. (See DISPENSARY.)

Construction.—In the construction of a hospital, it must ever be borne in mind that the great, the important points to be considered are an abundance of light and air. These desiderata are almost invariably so deficient in the places from whence the sick are brought that they thus prove the great factors in disease production. Again, cheapness and even ready destructibility are required. The latter is too often of greater importance than one at first would imagine. Thus, when an epidemic of infectious disease, as puerperal or child-bed fever, causes death after death, the ward or wards need purification as by fire.

In fact, in more than one instance, the burning of such a hospital has proved as though a direct interposition of Providence to teach men how to deal with the germs of disease. In certain cases the wards have been stripped of perishable articles, and huge furnaces have been kept at an intense heat for days, with the windows and doors almost hermetically sealed, in order to destroy such germs. Where a ward, as of the pavilion or hut form, is inexpensive in construction, it may readily be destroyed.

In the war of the rebellion, when hospital gangrene made its appearance in the wards of the army hospitals, much benefit was obtained by the erection of large tents, and the removal of cases to this shelter. It is reported that almost invariably a check was at once put upon the progress or spread of the trouble. Again, where a larger or more substantial building has been erected, in cases of infection of the wards by the presence of disease, the plaster may be entirely removed, and also the flooring; and these being renewed, the building is again placed in a healthful condition.

The important data for such a building will be about 100 feet square of space for each bed, and 1200 cubic feet at least of air-space for each patient. Not to exceed thirty patients, to be under the care of one head-nurse and in one ward. Crowding under no circumstances should be permitted, whether of patients in the wards, or of wards upon other wards, as thus much of the value of a hospital is sure to be interfered with if not positively destroyed. In diseases of an infectious nature there should be every opportunity for the most positive isolation. The means for ventilation here will prove a great source of benefit. In this connection we may refer to the report of the building committee of the Pennsylvania Institution for the Deaf and Dumb, located in Philadelphia. It may be mentioned in passing, that, prior to the erection of the additional buildings, fully equal in capacity to the original institution, rats had proved a great source of annoyance. "The old buildings were so overrun with such vermin that, on the removal of plaster ceilings under the main floors, the stench was so offensive as to sicken the workmen, and to reveal the danger of a pestilence that had been ignorantly incurred. After ascertaining the fact that rats will not inhabit buildings when their access to the ground is wholly cut off, the committee remedied this so thoroughly that not a rat is to be found about the existing institution. The floors of the basement are made of lithogen cement, the upper stratum of which is composed of white sand and Portland cement in equal quantities." In the basement are four reservoirs of pure air, forced down from the roof by an inexpensive contrivance that gives a pressure when the wind blows, superior to any resistance on the windward side of the building. Thus there is a steady flow of air, warmed by the furnaces, into each school-room. During warm weather this method will supply the rooms with pure air at a low temperature. The ventilation of the various dormitories, sitting- and school-rooms, is further promoted by a number of ventilating shafts, nine of which are 4½ feet in the clear and 60 feet high. "The products of combustion are conveyed up these shafts in iron pipes, which terminate 3 feet below the top of the chimney, which is reduced in size by a gradual slope to quicken the exit both of the foul and the heated air. These shafts ventilate the kitchen, sitting-rooms, play-rooms, and especially the dormitories. In the latter there are four large openings at the floor adjoining the external walls at each end of the building. The beds are arranged head to head in the middle of the room, because the breath, being 30° warmer than the surrounding air, ascends to the ceiling and passes over to the cold external walls on each side of the room; it then descends, and is immediately drawn off by the large shafts, in which an active upward current is induced by the hot iron pipes, and also by the peculiar arrangement at the top of the shaft, which is capped in a manner highly promotive of ventilation. This arrangement of beds favors the use of the windows, which would otherwise let the cold air fall upon the heads of the children." "The water-closets are perfectly free from all offensive odors, as the draught is downwards into ventilating shafts, and the water is drawn off from the closets twice every day."

Again, with its own proper ventilation and warming apparatus, each ward must be perfect in itself, so that it will prove a matter of impossibility for infection to be transmitted from one to the other. Warming and ventilation go side by side, and hence, no matter what system of heating is adopted, much will depend upon the care with which the currents are compelled to enter in a pure condition, and after collecting in their course the odors, etc., to pass off without any obstruction. Hence is required the most constant vigilance as to cleanliness, proper working of all the machinery, whether human or artificial; and thus is avoided the opportunity for any part of the establishment to become tainted, which, though imperceptible to the senses, yet in due time makes its presence known and felt by the increase in mortality. Cracks in plastering, open seams or the like in any part of the ward, become a nest in which may germinate the most fatal forms of filth disease. It has been frequently observed that these diseases result from or are produced by decay of flooring or plastering, as from dampness, or where, owing to the urgency of the case or parsimony in building, inferior material has been employed in construction. In all such instances cremation of the building is the only positive remedy.

Where possible, sufficient space should be secured around a hospital building to secure full circulation of pure air. While it may be necessary in order to prevent intrusion to have some form of enclosure, in many instances this is a high stone or brick wall, which is highly objectionable as giving too much the appearance of a penal institution. Better will be a low wall with a railing on top of sufficient height to fulfil the indications. The enclosed grounds are to be graded and planted with appropriate trees and shrubbery, avoiding any forms which would give either too dense a shade or, when in the process of fructification, an unpleasant odor. As a hospital should ever be surrounded with all that is calculated to aid the return to health, so its style of building should be cheerful and attractive, not dark and gloomy, nor, on the other hand, needlessly ornamented or glaring to the eye. It has been found by observation that the inner walls when plastered with a finishing coat of very hard material have proved least liable to allow of the retention of disease-germs. This coat should be perfectly smooth, as a rough coating affords abundant opportunity for the collecting of dust as it floats in the air, and undoubtedly germs of all kinds would find this a very suitable place for lodgment and propagation. Floors should be of cement, or hard, close-grained wood laid with great care, and for the same reason as that stated relative to the plastering. As it is always objectionable to cover them with carpets of any kind, wood floors should be stained and oiled. A moment's thought will show the advantage of this plan, as cleansing a soiled floor by scrubbing in the manner usually adopted gives dampness and its consequent injurious results to the inmates.

In all apartments, as the laundry, etc., where water inevitably must be freely used, the floor should be of slate or flag of some material, so as to prevent the absorption of the dampness. Too much stress cannot be laid upon the importance of the water-closets. They should be easy of access, and in every way provided with means for self-purification. It is too much to expect that all or even a majority of the inmates of any institution, but especially a hospital, can be so imbued with the value of care and cleanliness as to be painstaking when using a water-closet, and therefore these should be as much automatic in their action as may be, and should always be regarded as a source of possible contagion and subjected to the most careful observation. A very interesting experiment as to purification of all such places is found in Mouat and Snell's work on *Hospital Construction*: "The Hindoos of every part of India from time immemorial have possessed a means of purifying the atmosphere of their rooms and huts, by spreading a light coating of a mixture of earth containing organic materials on their walls and floors, which enables them to dispense, to a considerable degree, with ordinary ventilation. The process is called 'leoping,' and is usually performed by the women of the household. With a view to submit this proceeding to a practical test, I had four cells, each containing 480 cubic feet of air, and practically unventilated, carefully prepared. Two of them were lime-washed and the two others leoped. I had four healthy prisoners locked up in them at night, one in each cell. On opening the cells next morning the two which were lime-washed were stuffy and offensive, redolent of the peculiar animal odor exhaled by native prisoners in such circumstances. The two others were as fresh and as pure as if no one had slept in them. This led me, as head of the prison department, to direct the application of the principle generally in all the jails under my administrative control, so far as it was susceptible of direct application to walls, floors, and earthen beds. I also employed charcoal extensively for the same purpose—the purification of the air of prison wards from animal exhalations—and I had reason to believe with success." The same authority says: "Associated with the purity of person and place is that of the disinfection and cleansing of all clothing and bedding, and the immediate destruction of all dressings, etc., for which, as a rule, due and proper provision is or requires to be made."

The drainage and water-supply are equally important matters. The water should be in great abundance and known to be pure. Wells or stored water, as in reservoirs, should be examined frequently and with great care. In a large city the manner of drainage will depend largely upon that which is furnished by the municipal authorities. In the country, or where isolated, the excreta should be cared for on the dry system. Earth will always constitute the best deodorizer and disinfectant. The subject of drainage requires a special consideration and therefore cannot be given here in detail.

Kitchens and laundries, as well as any other departments of a hospital which are likely to produce an atmosphere injurious to the sick, should be completely separated from the wards containing the patients; never beneath the sick-wards if possible to avoid it. The kitchen and laundry should be so separated that by no possibility could the air of the latter be carried to that of the former. While the tendency to combination of a series of wards, and hence an increase in the number of inmates, is reasonable with the remembrance of the importance of thus reducing the running expenses by placing a larger number under one management, etc., yet it must not be forgotten that this must not be carried on without limit. The best authorities regard that limit as 600, say about 20 wards with 30 patients in each. In all cases surgical wards will demand additional amounts of floor-space and cubic feet of air, and also where disease prevails which causes deterioration of the air to an unusual extent. Beds should never be less than nine feet apart. The furniture should be of the simplest character; there should be no curtains or hangings of any kind, and closets only for very particular purposes, as the necessitated locking up of medicine, etc. Recently it has become quite customary in some localities to introduce pictures, flowers, and a variety of decorations, with a view to lend cheerfulness and break the fearful monotony of blank space which is often regarded as detrimental to the convalescent. These are good only so far as they are not allowed to interfere with the air of the ward.

One point necessary for hospital constructors to bear strongly in mind is that they must equally be careful to protect the surrounding air from vitiation. Of course, this more particularly applies to large cities where such institutions are usually necessarily located in the midst of dwellings, stores, etc. Especially has this been demanded with hospitals for cholera and small-pox cases, and so dangerous have these been regarded that an imperious public clamor has compelled their location in the rural suburbs. But there are other causes of vitiation incident to the aggregation of large numbers of cases of disease. Hence, provision must be made that the ventilating shafts shall carry their foul air away from the atmospheric supply of the neighborhood, and that antiseptic precautions be taken that will destroy germs of infection from every source.

In order to avoid the vitiation of the air by tobacco-smoke, which unfortunately has become a necessary evil of the day, an appropriate separate place must be provided for convalescents who may be allowed to return to such a habit. This place must be so arranged that the smoke, etc., cannot be carried into the wards. Again, as convalescents are greatly aided in their recovery by fresh air and exercise, here galleries easily reached from the wards have been utilized. Better, however, will be open verandas with a southern exposure. These may be enclosed with glass, and shut off by doors from the corridors or halls. In every hospital there should be provided small apartments for use in cases where it might become necessary to remove a patient from his fellows. For the same purpose, movable screens should be an adjunct of every ward, that at a moment's notice privacy may be obtained for a patient.

Soiled garments, etc., are never allowed to accumulate, but are thrown into a shaft which carries them at once to the basement, whence they are removed to the laundry. This shaft is coated with smooth, hard plaster and open, not into the wards but into the stairway.

Where clinical teaching is designed to be connected with a hospital an appropriate amphitheatre is necessitated, capable of comfortably seating the students, and so arranged that patients may readily and without fatigue be brought to the arena. Here, placed on the revolving table, or it may be seated in a rolling-chair, one may be exhibited to the class, or the requisite operation be performed. It is better to have this room as much away from the wards as may be. An excellent example may be seen in the Pennsylvania Hospital of Philadelphia. Where the amphitheatre is located in the midst of the wards, as is too often the case, it becomes impossible to prevent disturbance of patients by the noise and clamor of the class. In fact, the mere tramping of the students as they disperse after the clinic is apt to strike terror to many of the inmates, who are keenly alive to the dangers of fire, etc., and their inability to aid themselves in making their escape. Or, where this may not obtain, the cries and struggles of patients are too often plainly heard by others who may be dreading their turn, and thus are excited and their nervous system so shocked that injurious results might follow an operation.

As there will be constant need of splints and orthopedic apparatus, both for convenience and economy, a machine-shop within the grounds should be erected, and appropriate machinery placed therein. By this means much time and great expense will be saved, and often an ingenious convalescent will be enabled to work out a valuable apparatus, under the direct supervision of the surgeon desiring it, and with the patient close at hand upon whom to test its fitness. An example of such a shop and its value may be seen at the hospital of the University of Pennsylvania.

No hospital can be regarded as complete without the best form of ambulance to carry accident or other cases most safely to the buildings. For many cases, and those at no great distance, stretchers may be employed, and a number of these should always be at hand that no delay may occur when they are required. A point that seems greatly to be lost sight of is the fact that very many cases are better conveyed upon the rudest form of stretchers, as seen in the door unhinged for the purpose, or the settee which is found in nearly every house, and properly supplied with quilts or blankets to protect projecting points. In the usually rough streets of our large cities, and with the constant obstructions to which they are subjected, the stretcher will be found preferable as avoiding the jarring which is so liable to occur, and which, in many instances, has added vastly to the complications of the injury, or the shock and consequent depression of the sick man. It would be well if the general public could be instructed on this point, as their officious, perhaps well-meant, efforts frequently are productive of great harm. It need only be remembered that broken bones are very apt to be driven through the flesh and skin until their splintered ends protrude, by the worse than useless efforts of the bystanders to carry a wounded person in the arms of several, without some form of apparatus to keep the injured parts from further displacement. Hence the value of the recent ambulance system now established in most of our large cities, by which the hospitals are notified and can send an ambulance with a physician provided with apparatus and medicine to meet an emergency. Thus, hemorrhage may be stanched, broken bones supported, shock prevented; in short, the work for which the institution is created is materially aided.

In recently erected hospitals it has been found wise to build large bay-windows in all the wards, which serve greatly to relieve the monotony of the straight corridors, and are always regarded by the inmates as pleasant places to sit during convalescence. These, with the first floor on iron beams and brick arches wherever there are steam-pipes and radiators in the cellar beneath, making the attic floor of a similar fireproof construction, with metal cornices, have been regarded as the latest improvements.

Protection of the most thorough kind against fire should hold a first place. Inner plugs and hose may prove valuable in the early stages of a conflagration, but added to these there should be a good supply of hose and plugs on the outside, as otherwise, when the fire-apparatus on the inside is rendered useless, there is no alternative but to watch the progress of destruction. A recent fire at an insane hospital where this order obtained gives rise to this suggestion.

Army Hospitals.—By *Circular No.* 10 of the Surgeon-general's Office the following specifications have been given for this important class of hospitals, which may serve also as a guide for others:

A hospital of 24 beds consists of a central administration building and two wards arranged as wings, each wing 45 feet 8 inches long by 25 feet 4 inches wide and 15 feet high in the clear from floor to ceiling. In very cold climates the height may be 12 feet with a length of 50 feet. Attached to each ward, and at the outer end and behind, will be room for earth-closets. The administration building will be 36 feet 4 inches front by 40 feet 4 inches deep, and 2 stories high, with a back building of 43 feet 8 inches by 15 feet 4 inches. Each story 13 feet from floor to ceiling. A veranda 10 feet wide will surround the hospital. In hot climates the wards will be detached from the main building, connected with it by the veranda. The back building will also be separated.

In malarious climates it is desirable that a ward shall be in the second story, hence the building will be 2 stories high, 78 feet 10 inches long, 26 feet 4 inches wide, with a veranda as before.

The regulation hospitals will usually be built of wood, but brick, stone, or other material may be used. A provisional hospital may be constructed of logs, lumber, or adobe. This is where no delay can be allowed.

In the mason work all sills will be supported on stone or brick piers or timber posts. Stone piers should be 2 feet by 1 foot 4 inches, of large flat-bedded stones, laid to break joints. If brick they shall have a stone footing 2 by 2 feet and 6 inches thick. The brickwork shall be 18 by 18 inches, of hard-burnt brick. All piers to be built in good lime-mortar. Wooden posts should be of cedar or locust, no less than 8 by 8 inches. Piers to be carried deep enough to secure from frost. Frame a balloon frame, sills 6 by 8 inches. All sills will be mortised, tenoned, and pinned to each other. Studs framed or notched into the sills and with the joists strongly and securely nailed to the sills. The studs for exterior walls will be notched at ends to fit the sill mortise, and will be 2 by 6 inches, placed 16 inches from centres, doubled at all corners and openings, and well braced and bridged where necessary, being braced at the corners at least 5 feet upon the studs and bridged over all openings. Joists of second floor will be carried on a ribbon, 1 by 4 inches, let into and strongly nailed to studs. Partition studs 2 by 4 inches, 16 inches from centres. All joists 2 by 10 inches, 16 inches from centres, spiked to studs, with three rows of herring-bones, 1 by 1½ inches, bridging in the width of ward building, and one row in width in other spans. Ceiling joists will rest on a wall plate, spiked to the studs in two thicknesses of 2 by 4 inch stuff, put on to break joints. Roofs will be of 2 by 8 inch stuff, back building of 2 by 6 inch. Roof of administration building will have 3 by 12 inch hip-rafters resting inside on partitions. Rafters 2 feet apart. Rafters for wards 2 feet 8 inches apart. Roofs of verandas will have 2 by 6 inch rafters, 2 feet apart. All roofs sheathed. Roofs shingled, laid ⅓ to the weather. Ventilation on the ridge of 2 by 4 inch stuff, covered with shingles and lined with ⅝ matched, tongued, and beaded stuff to form inside ceiling. Veranda posts will be 7 by 7 inches, braces 4 by 4 inches, all framed together. All exterior walls will be rough-boarded with inch boarding, in which will be laid a covering of tar paper or felt, and finished with clean siding, each lapped 1½ inches on the other. All windows double hung. Exterior doors 3 feet by 7 feet 6 inches by 1¾ inches, hung with 3 hinges to each door. Transoms over each door hung on swivels.

In all cases the ground-floor must be raised at least 18 inches from the ground. In warm climates and malarious regions the ground-floor should be raised at least 3 feet above the ground, on piers or open arches. To insure cleanliness the space between piers or arches should be filled with lattice work sufficiently open to allow free ventilation. A good cistern of suitable capacity is to be constructed and connected with the gutters and eave spouts of the roof. In northern climates, where the nature of the ground is suitable, a good cellar, well drained and ventilated, is to be constructed under the kitchen. The dispensary is to be neatly fitted with shelving, drawers, and counter, and the store-rooms with shelving, which, for bedding and clothing, will be open racks with slat bottoms. The windows of the administration building, both above and below, will be furnished with outside shutters, and will be 6 feet 6 inches high by 3 feet 3 inches wide.

The windows of the isolation ward should be made secure with a frame containing an iron grating, this room being intended to receive sick prisoners, cases of *delirium tremens*, etc., when not in use for cases of low fever, etc. Contagious diseases, as small-pox, should be treated in hospital tents when the weather permits, and the isolation ward should not be used for such cases. The dimensions given each room must be attained in the clear. At posts where the mean temperature of the winter is liable to fall to 28° Fahr., the ceiling of the ward being 12 feet from the floor, the windows will be double and 9 feet high by 3 feet 3 inches wide.

The arrangements for ventilation of the wards will vary according to climate. On the Gulf coast and in Arizona the wards will not be ceiled and will have ridge ventilation their whole length. At all posts where continuous artificial heat is required for three months in the year, the wards will be ceiled and have boxed openings carried from the centre of the ceiling to the ridge for summer ventilation. There will be two of these openings, each 10 feet long by 2½ feet wide, and 10 feet apart, each filled below with lattice work and above with movable shutters. A ventilating shaft 6 inches square will be placed in each earth-closet room, and the lamp or gas-burner of this room should be directly beneath this shaft. The chimney of the kitchen will be built with two flues, one of which will open near the ceiling and be used exclusively for ventilation.

In hospitals built of brick, the walls will be 12 inches in thickness, built hollow, a space of not less than 3 inches being left between the inner and outer shells, which will be tied together at intervals of not less than 2 feet by banders; the air-chambers thus formed must be made as nearly airtight as possible by closing them at top and bottom, and laying the brick carefully in full mortar. (W. B. A.)

HOTELS (from Latin *hospitalis*, through the Old French form *hostel*) are a mark of advanced civilization which accords with the railway and steamship. In former times, when 30 or 40 miles was the rate of a day's journey, inns were numerous, but the restricted travel neither urged their enlargement nor pushed their display beyond comfort. Now, that travel can be so planned as to end the day in a city or large town, and as its extent and ease have been so greatly augmented, the needs and competition of innkeeping have developed the hotel to a degree which merits the term "palatial."

Although certain demands may control their scope, nearly all the recently built hotels of America and Europe have in common so many principles of design and operation that the points of difference are few and need only be described as they are reached; thus the great hostelries built over and in conjunction with railway termini, the best commercial and the so-called elegant and fashionable hotels, are so little different in appointments and service that they may be grouped, forming a type. In a hotel of this class there are usually from 400 to 800 rooms, including the dining-halls, public chambers, and parlors. In the basement are the machinery spaces, the mechanics' shops, wine-cellars, servants' dining-room, laundry, wash-rooms, public closets, and storage-rooms. Upon the ground floor the halls and entrances usually open into the shops of an outfitter, a barber, and a druggist, the public reading- and writing-rooms, the telegraph and passage ticket-offices, the wine-room, or bar (in America usually large and exceedingly ornate), the coffee-room and restaurant, and the hotel-office. In Europe the latter is quite small, and often in charge of women, being devoted chiefly to the allotment of rooms, the posting of charges as they come in from the eating- and wine-rooms, and the care of mails; whereas in America the office is the resort of the male population of the hotel; and, in addition to the duties above described, the clerks are expected personally to care for the comfort of each guest, as the client is called, to give him information he may ask, and to secure for him such introductions and favors that his business and pleasure may be promoted. The breakfast-, supper-, and dining-rooms are usually upon the second story, where are also the public parlors, the large chambers used for balls, banquets, and assemblies, and a few special suites of rooms. Upon the upper floors (the hotel having from 5 to 8 stories) are the living-rooms, for the most part in suites combining parlor and bath- and bed-rooms. Running through these floors at convenient points are the lift or elevator shafts, and distinct from the rest and with its own ventilation is the so-called back of the house, in which on convenient stories are the kitchens, pantries, bakery, the ice-room, sinks, and servants' quarters. Although the many divisions compel a large use of wood, the modern hotel is built with some regard to fire-proof effect. The walls are of stone and brick, the girders and many of the stairways are iron, the basement and ground floors are of concrete and tiling, and in some cases the upper floors are cemented. Generally the stokers, watchmen, and a certain number of the night porters are drilled as a fire-brigade. Ample lines of hose are hung near standpipes upon the several stories, and special steam-pumps are always kept in readiness. So efficient are the precautions against fire and its damage that hotel insurance is often effected at rates lower than those of other risks in which hazards of the same class are met. Abundant light is secured to the inner halls and rooms through the wings and courts, and there are sky-lights over the lower and unbroken floors. Ventilation is generally excellent. Much is done by the elevator-shaft, aided by the heating of the halls, which draws and expels air through the many open places, and a judicious arrangement of the baths and closets makes quite efficient their system of pipes and flues running to the roofs. In many cases the city's supply of water is unsatisfactory, and artesian wells have been sunk. Then the water is usually pumped into large tanks on the roofs, whence it is distributed, and a certain supply which has been heated by passage over the exhaust- and other steam-pipes is forced to all the baths and chambers. The arc form of the electric light is much used in the lower halls and larger rooms, but the incandescent form at present appears to have certain disadvantages for general use in hotels, and gas is not yet superseded. Steam-heat is usual in the corridors and large spaces, but the public parlors, the meeting and other rooms are furnished with fire-places.

The service is the test of the hotel's quality, and it receives great attention. The working management is usually dual, the superintendent (often one of the proprietors) directing the office and its functions, and the steward having charge of the marketing, the eating-rooms, the kitchens, and their branches. The office force (in America made up of room clerks, answering clerks, and cashiers) is divided into two watches, alternately serving 6 hours one day and 12 hours the next, and there is a night clerk with important duties who serves from midnight until 7 A. M. The bellmen, grouped near the office in America and in Europe distributed throughout the hotel, answer the electric calls which are in each room, and are likewise detailed in alternate day-watches and night service. Each public entrance of the hotel has its attendant. The housekeeper oversees the chambermaids and the force of cleaners and scrubbers, and is expected to secure nurses in case of illness and to act as the female representative of the management. Each chambermaid has the care of from 10 to 20 rooms, her work varying with the population of the hotel. She is allotted and is answerable for a certain supply of bed and toilet furniture, and is required to report to the inspector any leak, breakage, or damage; and, since her work keeps her about the rooms and halls throughout the day, to guard the property of the hotel and its guests. The inspector's duty is to visit each room as soon as it is vacated, to report its condition to the office, and to patrol the corridors as a check to mischievous or thievish intrusion. At night the watchmen, usually three, make the rounds of the hotel, visiting every half-hour each connection of the electric watch-clock, which should present to the night clerk a complete record of the patrol. At 2 A. M. the scrubbers take possession of the lower halls and public rooms, and thoroughly clean the tiled floors, stairways, and woodwork; then, after daybreak and until noon, when their work stops, these women scrub and clean the floors and painted surfaces in different parts of the hotel with such system that twice a week every part is visited. Shortly after midnight a count is made, and the exact number of guests is sent to the night steward, and the bakers begin to work up the breakfast rolls and muffins and the bread which will be required during the day. The night steward now inventories the larder and ice-room and prepares the day's marketing-slips for the buyer, who starts out at 6 A. M. The average of the season shows that the larder is generally stocked with provisions for 2½ days, and of dry and preserved stuff there is usually a week's supply. After 3 A. M. the morning cooks report for duty. These are known as broilers, stewers, and friers, and with the rest of the kitchen force are under the orders of the *chef*, who has entire charge of them. All wages are paid to him, and he has the power to hire and discharge. When a new *chef* is engaged he appears with his own force of from 8 to 12 men, the former cooks leaving to a man. The individual pay of a *chef* ranges from $1500 to $5000 a year, and a daily supply of wine for himself and staff is included. These cooks are helped by 7 or 8 women, who dress the fowls and prepare the ordinary vegetables. The soups and made dishes, especially the latter, are the work of the *chef*, who, with the steward, prepares the *menu*, in which, although there are certain constant features, there will be daily a distinct character that the bill of fare may please the refined and epicurean as well as the unexacting tastes. At 5 A. M. the waiters appear, the urn-keeper prepares the coffee, tea, and chocolate, and breakfast is served to those who will leave by early trains. This meal lasts until noon, when another force of waiters sets forth the luncheon. This is followed at 2 P. M. by the dinner, which is served until 8 o'clock. Tea, beginning at 6 P. M., is merged at 7.30 into supper, which then goes on till 12.45 A. M. Meanwhile in the coffee-room and restaurant there is maintained an informal service of meals from 7 A. M. till midnight.

A point of difference between the American and European plans of meal service may be here mentioned. By the former each meal has a fixed price, while the latter means a charge for each dish ordered; however, there are concessions from these plans in either form of hotel. Thus in Europe there is always a dinner called *table d' hôte* which is served complete at a certain sum, and in most of the American hotels a guest may arrange to be served after the European plan. The variety of food furnished in hotels is great, and the quantity may be judged from this statement, which presumes the daily supply for 400 guests: 672 lbs. beef, 200 lbs. mutton, 540 lbs. poultry, 143 doz. eggs, 252 qts. milk, 75 lbs. table-butter, 3 bbls. of flour. These figures of course include the food consumption of the servants, and to a population as above there are usually, of clerks and foremen and their assistants, 25; of cooks and pastrymen, waiters, bellmen, ushers, and porters, 150; of chambermaids, scrubbers, laundry and kitchen girls, 110; a total of 285. As the supplies come in the storekeeper receipts for them, and they are only dealt out upon an order signed by the chief of the department in which they are needed; every day these orders are filed with the bookkeepers, and every week they are made to tally with the storekeeper's report and the bills against the hotel; then the number of guests is brought into comparison, and the management may thus determine exactly the expenses *per diem* and *per capita*. Though a high class of service is required the wages are comparatively good, and they are paid monthly. Every 30 days a complete account of stock is taken: the loss and breakage are great, despite a system of fines, for the ware is constantly handled and a piece may be used more than twice during one meal. In Europe the hotel's washing is usually done by contract, but American hotels as a rule contain a laundry in which also is taken the washing for guests. As the bed and table linen is changed after each use and as a great supply of towels and small pieces is necessary, the daily laundry work is large and demands the best features for facilitating and expediting the labor, such as steam-wash-tubs, wringers, and drying-rooms.

In the large scope of a hotel the daily wear and accidents are such that a carpenter, upholsterer, mason, painter, plumber, and their helpers are in regular service and constantly employed. The carpets are generally renewed every three years, and at the end of a like period the interior of the hotel will have been entirely repainted. The hotel furniture, which is substantial and often lavishly rich, is constantly under repair and replacement. A map of the flues, drains, and pipes provides for the stoppage of a leak or break with very slight disturbance of fixtures.

The charges are varied and are always controlled by the stay of the guest and the position and extent of his quarters. In Europe a certain daily fee is charged for attendance; in America this personal service is gratuitous, and there are no other extra charges save for fire and the private service of meals and other refreshments. The fee-system in Europe is omnipresent and seems to be ineradicable in hotels, although honest attempts to suppress it are made by most innkeepers, as they cannot scale their pay-rolls in consideration of this extra profit to their servants without incurring the inattention of these to such of the guests as may be careless of or insensible to this sort of levy. Of this, however, American hotels are almost free. The property of the guest is always under guard, which inn-keepers maintain is a matter of courtesy, not obligation, and quote a statute defining their liability as not for loss of property which has not been deposited in their safes. (E. C.)

HOUDIN, Robert (1805–1871), a French conjuror, was born at Blois in 1805. After he was educated at the College of Orleans his aptitude for mechanics led him to follow his father's trade of watch-making, and he also learned something of natural magic. After he went to Paris, his mind, overtasked, gave way. On regaining his mental powers he made mechanical toys and automata, for which he won a medal at the Paris exhibition of 1844. He conducted magical soirées in the Palais Royal from 1845 to 1855, which became famous throughout Europe. He then retired to Blois with a large fortune, but in 1856 was sent by the French government to Algeria to compete with the marabouts or priests in performance of pretended miracles. After many singular adventures he succeeded in breaking down the influence of these impostors on their countrymen. Returning to France he published *Robert Houdin, sa vie, ses œuvres, et son théâtre* (1857); afterwards his *Confidences* (1859; translated into English 1859); and finally *Les tricheries des Grecs dévoilées* (1861). He died at Blois, June, 1871.

HOUGH, Franklin Benjamin, an American author, was born at Martinsburg, N. Y., July 20, 1822, being the son of Dr. Horatio G. Hough. He graduated at Union College, Schenectady, N. Y., in 1843, and studied medicine, taking his degree at Cleveland Medical College in 1848. He practised his profession for four years at Somerville, N. Y., and has since been engaged in literary and scientific pursuits. He was superintendent of the New York State Census in 1855 and 1865; surgeon of the Ninety-seventh New York volunteers, 1862–63, and has been employed in forestry investigations under the department of agriculture since 1876. He has published histories of St. Lawrence, Franklin, Jefferson, and Lewis counties, N. Y.; *Indian Treaties of New York* (1861); *Pouchot's Memoirs* (1866); *Washingtoniana* (2 vols., 1865); *New York State Gazetteer* (1872); *American Constitutions* (1871); *Cultivation of Timber and Preservation of Forests* (1874); *Elements of Forestry* (1882); and treatises on meteorology, hospitals, and the early history of New York. He died June 11, 1885.

HOUGHTON, Richard Monckton Milnes, Baron (1809–1885), an English author, was born at Fryston Hall, Yorkshire, June 19, 1809. He graduated at Trinity College, Cambridge, in 1831, and spent much time in travel in Southern Europe and the East. In 1857 he entered Parliament as member for Pontefract, and represented that constituency until 1863, when he was raised to the peerage as Baron Houghton. He was at first a conservative but afterwards a liberal, advocating popular education and religious equality. He published political pamphlets and speeches, and several volumes of travels, but was best known as a poet and as the friend and biographer of Keats. Many of his poems relate to oriental scenes and subjects. His style is graceful, and his tone of thought subdued, yet cheerful rather than melancholy. He died Aug. 11, 1885. His publications include *Memorials of a Tour in Greece* (1833); *Memorials of a Residence on the Continent* (1838); *Poetry for the People* (1840); *Memorials of Many Scenes* (1843); *Palm Leaves* (1844); *Poems, Legendary and Historical* (1844); *Good Night and Good Morning* (1859); *Monographs, Personal and Social* (1873); *Poetical Works* (1874).

HOUSSAYE, Arsène, a French author, was born at Bruyères, near Laon, March 28, 1815. At an early age he went to Paris, and there began his literary career in 1836, with two novels, *La Couronne de bluets* and *La Pécheresse.* The friendship of Jules Janin and Théophile Gautier and his co-operation with Jules Sandeau gave him an assured place among the authors of the time. He was especially noted as an art critic and historian. His *Galerie de portraits du XVIIIe Siècle* (1844) and his *Histoire de la peinture flamande et hollandaise* (1846) were received with marked favor. In November, 1849, he was appointed manager of the Théâtre Français, which became a means of promoting the policy of Louis Napoleon. In 1856 the loss of his wife gave Houssaye an excuse for withdrawing from a charge which brought upon him a heavy burden of scandals. He was then made inspector-general of the provincial museums. In 1861 he became one of the proprietors of *La Presse* and its managing editor. He has used a variety of pseudonyms, and has published *Le Roi Voltaire* (1858), and many sketches of writers of the eighteenth century; three series of *Les Grandes Dames* (1868–70), and numerous novels, some of which are historical. His volumes of poems issued at various times have been collected under the title *Poèsies complètes* (1877). His few plays are of little account, but his critical and biographical sketches are animated, witty, and graceful.

HOUSTON, a city of Texas, seat of justice of Harris county, and the second city of the State in commerce and population, is situated on the navigable Buffalo Bayou, 49 miles by rail north-west of Galveston. Vessels drawing 9 feet of water can reach the town; larger craft load and discharge freights at Clinton, 8 miles distant. Houston has become a great railway-centre; the principal roads being the Southern Pacific (running from New Orleans to Southern California); the Galveston, Harrisburg, and San Antonio; the Galveston, Houston, and Henderson, which here connects with the International and Great Northern Railroad; the Houston branch of the Gulf, Colorado, and Santa Fé Railway; the Houston and Texas Central; the Houston, East, and West Texas; and the Texas Western Railway. The city has six passenger railway stations. It stands in a pleasantly undulating region, and its principal streets are well shaded and are traversed by horse railroads. It is the centre of commerce for a large and very fertile district, which ships here a great quantity of grain, provisions, meats, and cotton. It is also the chief point for the preparation and distribution of the products of the great pine forests of South-eastern Texas. Among the leading articles of manufacture are fertilizers, cement, cottonseed-oil, soap, flour, lumber, railway rolling-stock, wagons, farm and household utensils, castings and other metallic wares, machinery, etc. The city has churches of all the prominent denominations, and is well provided with schools (public, parochial, and private), newspapers, hotels, and banks. Among the finest buildings are the city-hall and market, and the Masonic temple. The population in 1870 was 9382; and in 1880, 18,646, since which time it has greatly increased.

HOVEY, Alvah, an American clergyman, was born at Greene, N. Y., March 5, 1820. He graduated at Dartmouth College in 1844 and at Newton Theological Institution in 1848. He was then ordained pastor of a Baptist church at North Gloucester, Mass. In 1850 he became instructor in Biblical literature at Newton Theological Institution, in 1853 professor of ecclesiastical history, in 1856 professor of Christian theology, and in 1868 president of the institution. He has published *Life and Times of Isaac Backus* (1858), *State of the Impenitent Dead* (1859), *Miracles of Christ* (1864), *Scriptural Law of Divorce* (1868), *God with Us* (1872), *Religion and the State* (1874).

HOWARD, John Eager (1752–1827), an American soldier and statesman, was born in Baltimore co., Md., June 4, 1752. He became a captain in a Maryland regiment in 1776, and fought in the battle of White Plains, N. Y. His corps was dismissed in December, but he rejoined the army as major in April, 1777, and distinguished himself at Germantown, where he commanded his regiment. His commission as lieutenant-colonel dated from March 11, 1778. He was present at the battle of Monmouth in June, 1778. He went to the South with the Maryland troops in April, 1780, and served under Gates at Camden, S. C., Aug. 16. At the battle of Cowpens, Jan. 17, 1781, Col. Howard commanded the Continentals, and led them in a bayonet-charge which decided the fortune of the day. His troops again showed their courage and discipline at Guilford Court-house, March 15, and at Hobkirk's Hill, April 25. At Eutaw Springs, Sept. 8, Col. Howard was severely wounded. After the war he married Margaret, daughter of Chief-Justice Chew, of Pennsylvania. He was a member of Congress in 1787–88, and governor of Maryland from 1789 to 1792. Pres. Washington offered him the secretaryship of war, but he declined. He was a State senator of Maryland in 1795, and U. S. Senator from 1795 to 1803. Thereafter he held no official position, but in 1814, after the capture of Washington by the British, he strenuously resisted the evacuation of Baltimore proposed by some citizens. He died at Baltimore, Oct. 12, 1827.

HOWARD, Oliver Otis, an American general, was born at Leeds, Maine, Nov. 8, 1830. He graduated at Bowdoin College in 1850 and at West Point in 1854. He entered the ordnance corps, and in 1857 was made instructor in mathematics at West Point. After the civil war broke out he became colonel of the Third regiment of Maine volunteers, and at the battle of Bull Run, July 21, 1861, he commanded a brigade. He was made brigadier-general of volunteers Sept. 3, 1861, and fought in McClellan's Peninsular campaign. At the battle of Fair Oaks, June 1, 1862, he lost his right arm. At Antietam, September, 1862, he had command of the Second corps, and at Chancellorsville, May 1, 1863, of the Eleventh, which was routed by the fierceness of Stonewall Jackson's attack. At Gettysburg, July 1, 1863, after the death of Gen. Reynolds, Howard succeeded to the command at the front. He was transferred with his command to Tennessee in October, 1863, and was engaged in the battles of Lookout Valley and Missionary Ridge, Oct. 29, at Chattanooga, Nov. 23, and in the operations for the relief of Knoxville in December. In April, 1864, Gen. Howard took command of the Fourth corps, Army of the Cumberland, and in July following was placed in command of the Army of the Tennessee. He fought in most of the battles from that of Chattanooga to Atlanta, and commanded the right wing of Sherman's army during its march to the sea and through the Carolinas. His commission as brigadier-general dated from Dec. 21, 1864, and he received the brevet of major-general March 13, 1865. He was appointed commissioner of the Freedmen's Bureau May 12, 1865, and held that office until June 30, 1872, when its operations closed. He was also made, in March, 1867, a trustee of Howard University, which was established at Washington for the higher education of the colored race. He was made president of that university April 6, 1869, but resigned in 1873. He was then sent as commissioner to the Apaches in New Mexico He conducted a campaign against the Nez Percés from May to November, 1877. His pursuit of these Indians for 1300 miles is related in his book, *Chief Joseph* (1880. He also defeated the Bannocks and Piutes in 1878). In 1881 he was superintendent of the U. S. Military Academy, at West Point. In March, 1886, he was promoted to be major-general, U. S. A.

HOWARD UNIVERSITY, situated in Washington, D. C., is an institution of learning, chartered by act of Congress approved March 2, 1867, which defines its object in these words: "A university for the education of youth in the liberal arts and sciences." The fifth section provides "that the university shall consist of the following departments and such others as the board of trustees may establish: first, normal; second, collegiate; third, theological; fourth, law; fifth, medicine; sixth, agriculture." It originated in the Christian and philanthropic plans, in behalf of the colored population of the country, which were occasioned by the result of the civil war, which had just come to an end. Far-sighted patriots, who knew the degradation of the millions of the freedmen but foresaw also the prominent part which they must play in the future, felt that, while common schools were the prime necessity, care must also be taken to found institutions for the higher education of a portion of the negro race. This would be necessary to deliver them from undue dependence on the whites and on ignorant and incapable leaders of their own race, and to provide variety of employment for those of good natural ability who might aspire to become teachers, clergymen, lawyers, physicians, civil-engineers, architects, editors, and authors. It was further believed that no location for such an institution of varied learning would be so favorable as the national metropolis. It was easily accessible from all parts of the country, and presented special attractions to students and professors in a multitude of auxiliary instrumentalities and forces additional to the university itself, such as galleries of art, museums, libraries, hospitals, courts of law, especially the Supreme Court, the sessions of Congress, the capitol, the numerous public buildings and monuments, the several administrative departments, the churches and clergymen of various denominations, and the meetings of scientific, literary, religious, and political conventions. A residence in Washington is itself an education. There, also, it might be expected that the nation would conspicuously show to the world its purpose to redress the wrongs of the negro, not the least of which had been the denial to him of education. But, while it was planned to provide for the negro full opportunity of intellectual and moral culture, it was not deemed best to place the institution on a race basis by naming him as its object. Hence the charter only speaks of "the education of youth," and its doors have ever stood open to all qualified to enter, irrespective of race or sex. The Caucasian, the Mongolian, the North American Indian, and the negro have actually been numbered among its students, and ladies have graduated from its normal, college, law, and medical departments.

A site was selected on the northern edge of the city, commanding an extensive view of Washington and its suburbs. Commodious and tasteful buildings for lectures, dormitories, and professors' residences were erected through the aid of the Freedmen's Bureau, surrounded by a campus of 20 acres and facing on a park of 11 acres. The university was named in honor of Maj.-Gen. Oliver O. Howard, then head of the Freedmen's Bureau, who also became its president, and successfully promoted its interests in many ways, till, on the abolition of this bureau and his return to army service, he resigned in 1874. In December, 1875, Hon. Edward P. Smith accepted the position, but died a few months later on a voyage to the coast of Africa. In May, 1877, Rev. William W. Patton, D. D., LL. D., was elected president and still occupies the office. The instructors in the various departments number nearly 40, and the students in attendance slightly exceed 400. There are now in successful operation seven departments. The *normal course*, occupying from 3 to 5 years, according to the previous attainments of those entering it, fits for general business and domestic life, and especially for the work of teaching, giving an education in English branches, with the rudiments of Latin. The *preparatory course*, of 3 years, pays attention to the Latin and Greek classics, and fits for college. The *college course*, of 4 years, pursues the usual curriculum of reputable American colleges in the study of Latin, Greek, science, philosophy, history, mathematics, and English literature, with something of the modern languages. The *theological course*, of 3 years, provides a training in natural and revealed theology, exegetical study of the Scriptures in English and in the Hebrew and Greek, ecclesiastical and Biblical history, archæology, homiletics, and elocution. This course is evangelical but undenominational; the professors are of different ecclesiastical connections, and the students enter the ministry of various Christian churches. The *medical course*, of 3 years, has 3 branches, medicine proper, pharmacy, and dentistry, and the excellence of the instruction, the free access to the large hospital on the ground adjacent, and the cheapness of the terms have drawn large numbers of white students. The *law course*, also of 3 years, gives the usual preparation for legal practice. No charge for tuition is made in any educational department but those of medicine and law. The *industrial* department, lately opened, enables students to add a knowledge of the rudiments of several branches of manual industry. It is hoped that ultimately it may grow into a technological school.

The property of the university of all kinds may be valued at about $650,000, and is the gift of the government and of many private benefactors. The annual expenses are met partly from the income of a few endowments, partly from donations of individuals and charitable organizations, partly from tuition fees and room-rents, and partly from Congressional appropriations. Its numerous graduates are teaching and laboring in this and in other lands. The library and cabinet are yet small and inadequate. Its future is bright with promise. (W. W. P.)

HOWE, Elias (1819–1867), an American inventor, was born at Spencer, Mass., July 9, 1819. He was the son of a farmer and miller, and received a common-school education. In 1835 he went to Lowell and was employed in a machine-shop. Afterwards, while working in Boston, he developed his invention of the sewing-machine, and having constructed the first machine in May, 1845, obtained a patent Sept. 10, 1846. Though very poor, he went to England to introduce his invention, but meeting no success he returned to Boston in 1847. His patent had been infringed, and although he found some friends to assist him yet he was engaged for nearly seven years in litigation to protect his rights. At last, in 1854, the principal manufacturers, defeated in the courts, agreed to pay him royalties on the machines made by them. Under this arrangement his annual income increased to $200,000, and the total fortune obtained from his invention was $2,000,000. During the civil war he enlisted as a private in the Seventeenth Connecticut regiment, and served for some time. He received many marks of distinction for his invention. He died at Brooklyn, N. Y., Oct. 3, 1867.

HOWE, Joseph (1804–1873), governor of Nova Scotia, was born at Halifax, Dec. 13, 1804. His father, John Howe, had been a printer at Boston before the Revolution, but being a loyalist went with the British troops to Halifax, where he became postmaster-general. Joseph followed his father's trade, and in 1827 became part proprietor of the *Acadian*, and in January, 1828, sole editor and proprietor of the *Nova Scotian*. He was a liberal in politics, and by his opposition to the local government brought upon himself a libel-suit, in which he was acquitted. He also had a duel with Mr. T. C. Haliburton. Eventually, through the efforts of Howe and his friends, Halifax received a municipal charter. In 1840 he became a member of the provincial cabinet; he was also frequently elected to the provincial parliament, and was colonial agent in England for many years. In 1854 he resigned his position as provincial secretary to superintend the construction of the first railroad in Nova Scotia. When the formation of the Dominion of Canada was proposed, Howe insisted upon proper guaranties for the interests of Nova Scotia. After the federal government was fully established, he was secretary of state for the provinces from 1869 to 1872. He was also superintendent of Indian affairs. He was afterwards lieutenant-governor of Nova Scotia. He died at Halifax, June 1, 1873. His *Speeches and Public Letters* appeared in two volumes (1858).

HOWE, Julia Ward, an American poet, wife of Dr. S. G. Howe, was born at New York, May 27, 1819. Her father, Samuel Ward, was a banker, noted for his liberality and public spirit. Her mother was a lady of poetic culture. After receiving a careful education, of unusual range, Miss Ward was married in 1843 to Dr. S. G. Howe and made an extended tour in Europe. In 1850 she again went abroad and spent nearly a year in Rome. She took a deep interest in her husband's philanthropic labors, and was a warm friend of the anti-slavery cause. During the civil war she was a prominent worker in the U. S. Sanitary Commission. She contributed by voice and pen to many social reforms. Her administrative ability also led to her being selected as the chief of the women's department of the New Orleans World's Fair in 1885. Some of the poems written in her youth appeared in print, but her first volume, *Passion Flowers*, was published in 1854. Then came *Words for the Hour* (1856); then two tragedies, *The World's Own* (1857), and *Hippolytus* (1858); but her best were in *Later Lyrics* (1866), which comprised "Poems of the War; Lyrics of the Street; Parables; and Poems of Study." Her whole nature was deeply stirred by the terrible facts of the war; her great mental powers then found adequate occasion for making themselves felt. Of all her poems the most memorable is the "Battle-Hymn of the Republic," which, founded on the soldier's refrain called "John Brown's Hymn," gave expression to the deep moral purpose of the war. The fervor of the anti-slavery crusade and of war time she afterwards carried into her labors in behalf of woman's rights. Besides her poems she has published *A Trip to Cuba* (1858), and *From the Oak to the Olive* (1868), which is a record of her journey from London to Athens in 1867.

HOWE, Samuel Gridley (1801–1876), an American philanthropist, was born at Boston, Nov. 10, 1801. He was educated at the Boston Grammar School and Brown University, graduating at the latter in 1821. After studying medicine, he went to Greece in 1824, where he served as surgeon in the war for independence, and was placed at the head of the surgical service. In 1831, when he returned to the United States, he took part in the project for establishing an institution for the blind in Boston. Being appointed superintendent, he went to Europe to examine the schools for the blind. At Paris he was appointed president of the Polish committee, and as such he endeavored to carry aid to part of the Polish army which had crossed into Prussia. On going there he was arrested, imprisoned for six weeks, and then taken back to France. For his noble work in connection with the training of the blind see articles Blind and Bridgman, Laura Dewey, in Vol. I. He was also prominent in the work of the anti-slavery party in Massachusetts, and in 1846 was a Free-soil candidate for Congress. He assisted in founding a school for the training of idiots, which was afterwards organized as the Massachusetts School for Idiotic and Feeble-minded Youth. During the civil war he was an active and earnest supporter of the U. S. Sanitary Commission and its work for the soldiers. In 1867 he went to Greece in behalf of the Cretans, then struggling for independence. In 1871 he was sent by Pres. Grant as a member of the commission to visit San Domingo and report upon the advisability of its annexation to the United States. He died at Boston, Jan. 9, 1876. He published a *Historical Sketch of the Greek Revolution* (1828) and a *Reader for the Blind* (1839).

HOWELLS, William Dean, an American author, was born at Martinsville, Ohio, March 1, 1837. His father soon after became the publisher of a paper at Hamilton, Ohio, and the son learned the printer's trade. But he soon began to write for the papers both prose and verse, and in 1858 he was editor of the *Ohio State Journal*. Two years later, in company with John James Piatt, he published a little volume called *Poems of Two Friends* (1860), having edited, about the same time, a *Life of Abraham Lincoln* (1860). He was, in 1861, appointed U. S. consul at Venice, and there he remained until 1865, having in the meantime married Miss Eleanor Meade, sister of the sculptor, Larkin J. Meade. His *Venetian Life* (1865) and *Italian Journeys* (1867) record some of the impressions made upon his intellect and imagination by this long sojourn in a land so favorable to romance. When Mr. Howells returned to the United States he became an editorial writer for *The Nation.* He had already been a contributor to the *Atlantic Monthly;* in 1865 he became its assistant-editor, and removed to Cambridge, and in 1871 he succeeded Mr. J. T. Fields as editor-in-chief. A complete collection of his *Poems* was made in 1873. But Mr. Howells had now turned his attention to the faithful analytic portrayal of American character of the present day. Beginning with *Their Wedding Journey* (1872), this was continued in *A Chance Acquaintance* (1873); *The Lady of the Aroostook* (1875); *The Undiscovered Country* (1880); *Doctor Breen's Practice* (1881); *A Modern Instance* (1882); and culminated in *The Rise of Silas Lapham* (1885). Mr. Howells' skill in the delineation of character is only equalled by the ease of his style and his apt use of every-day incidents. Several comedies for parlor-theatricals have been added to Mr. Howells' publications in recent years. In 1885 he removed to New York city to take charge of an editorial department in *Harper's Magazine.*

HOWSON, John Saul (1816–1885), an English clergyman, was born in 1816. He was educated at Trinity College, Cambridge, graduating with honors in 1837. After taking orders in 1845, he became senior classical master, and in 1849 principal of Liverpool College, which position he held till 1865. He was then appointed vicar of Wisbech, and in 1867 dean of Chester. He is especially noted as joint author with Rev. W. J. Conybeare of *The Life and Epistles of St. Paul* (1850–52). Besides many sermons and lectures he published an essay on *Deaconesses* and the Hulsean lectures on *The Character of St. Paul* (1862). In 1880 he visited the United States and delivered lectures. Among his publications are *The Metaphors of St. Paul* (1868); *The Companions of St. Paul* (1871); *Meditations on the Miracles of Christ* (1871–77); *Chester as it was* (1872); and *The River Dee* (1875). He died at Bournemouth, Dec. 15, 1885.

HUBER, Johannes Nepomuk (1830–1879), a German theologian, was born at Munich, Aug. 18, 1830. He was educated in that city, studying theology and philosophy, and obtained the degree of doctor in 1854. In 1855 he became professor extraordinary, and in 1864 full professor of philosophy at Munich. His *Philosophie der Kirchenväter* (1859) gave offence to the Jesuits, and was placed on the Index. Huber then became a strenuous opponent of Ultramontanism, and afterwards of the Vatican Council. He was one of the writers of *Janus* (1869), and was the author of *Quirinus* (1870). He then became an active leader of the Old Catholic movement. He died at Munich, March 19, 1879. He published *Johannes Scotus Erigena* (1861); *Das Papstthum und der Staat* (1876); *Der Jesuitenorden* (1873), and some philosophical essays.

HÜBNER, Joseph Alexander, Baron von, an Austrian diplomatist, was born at Vienna, Nov. 26, 1811. He was educated at the University of that city, and in 1833 entered the government service. In 1835 he was made an attaché of the Austrian embassy at Paris, and in 1841 chief-secretary of the embassy at Lisbon. After the establishment of the French Republic, in 1848, Hübner was sent to Paris, and remained there as minister plenipotentiary until 1859. He was then recalled to Vienna on account of the outbreak of the war in Italy. He went on special missions to Naples and Rome, and was for a short time member of the Austrian cabinet. In 1865 he was again ambassador at Rome, and in 1868 he retired from public service. He visited the United States in 1870, and in 1871 he undertook a journey round the world, which he afterwards described very pleasantly in his *Promenade autour du Monde* (1873), which has been translated into English and German. In October, 1879, he became a member of the Austrian House of Lords. His great work on *Pope Sixtus V.* appeared in 1871, and has been translated into several languages.

HUDSON, Henry Norman (1814–1886), an American essayist, born at Cornwall, Vt., Jan. 28, 1814. He was brought up on a farm and apprenticed to a coachmaker, but fitted himself for college. He graduated at Middlebury College in 1840, and then taught in Kentucky, Alabama, and elsewhere. Having devoted himself especially to the study of Shakespeare, he delivered lectures on the great dramatist in many parts of the country. These were published in 1848, and established his reputation as a learned, discerning, and philosophic critic of the school of Coleridge. In 1844 Mr. Hudson had become a member of the Protestant Episcopal Church, and in 1849 he was ordained priest. On Jan. 1, 1853, he became editor of *The Churchman*, which he conducted for nearly two years. He afterwards edited the *American Church Monthly* in 1857–58, and was rector of the Episcopal church at Litchfield, Conn., in 1859–60. During the civil war he was a chaplain in the army, serving chiefly in South Carolina and with Gen. Butler on the James. He afterwards conducted a young ladies' school at Boston. Throughout his career he has continued his labors in Shakespearian criticism. His complete edition, with carefully revised text, notes, and biography, appeared in 11 volumes (1850–56). A school edition in 2 volumes was issued in 1871; and in 1873 he published *Shakespeare: His Life, Art, and Character* (2 vols.). He died Jan. 16, 1886.

HUDSON'S BAY is a large but shallow enclosed sea in British America, extending over about 13° of latitude from its southern extremity (James Bay) to the coast between Chesterfield Inlet and Southampton Island, and of nearly equal breadth. With the exception of a small area near the centre, but somewhat nearer to the eastern shore, the whole of the bay is less than 100 fathoms deep. Situated to the north and north-east of Manitoba, with which it communicates, not only by the large River Nelson, bearing the surplus waters poured into Lake Winnipeg by the Saskatchewan and Red River of the North, but also by the Severn and the Albany Rivers, Hudson's Bay would become the natural outlet for the productions of that province, could the navigability of Hudson's Straits be clearly demonstrated.

The expedition sent by the Canadian government to Hudson's Bay in 1884 seems to have proved that this outlet can be utilized. The icebergs met with at the western end of Hudson's Straits come from the glaciers in Fox Channel, and in August and September would form no greater barrier to navigation than do those met with in the Straits of Belleisle. The ordinary field-ice, though declared by the Esquimaux to be unusually abundant, offered no obstruction to the ship's course, though the heavy Arctic ice coming down from Fox Channel compelled a detour southward. No icebergs were met with in Hudson's Bay, nor were there reports of any. No difficulty was met with in navigating south of Dudley Digges Island, north-west to Chesterfield Inlet, south to Fort Churchill and York Factory, on the western coast, and then across the bay. Temperature observations taken during 15 months seem to show that the climate of Hudson's Bay is less severe than in many other parts of the dominion; and the ice observations show that Hudson's Bay and Straits are navigable for properly built and equipped vessels from July to October.

HUGER, the name of a Huguenot family settled in South Carolina, some of whose members have attained eminence. 1. **Huger, Isaac** (1742–1797), an American general, was born at Limerick Plantation, S. C., March 19, 1742. He served under Col. Middleton in an expedition against the Cherokees in 1760. On the outbreak of the Revolution he was made lieutenant-colonel of the First South Carolina regiment, and afterwards colonel of the Fifth regiment. He opposed the British invasion of Georgia in 1778, but was obliged to retire before a superior force. He was appointed brigadier-general, Jan. 19, 1779, and commanded the left wing at Stono, June 20, where he was wounded. During the siege of Charleston, in 1780, he commanded a body of light troops, but was surprised and defeated by Tarleton at Monk's Corner. He joined Gen. Greene's army, and commanded the Virginia brigade at the battle of Guilford Court-House, March 15, 1781, where he was again wounded. At Hobkirk's Hill, April 25, 1781, he was again in command, and exerted himself to regain the day. At the close of the war he retired to his estates. He died at Charleston, November, 1797. His brothers, Daniel, John, Francis, and Benjamin, were also active in the Revolutionary movements, and Maj. Benjamin Huger was killed at the siege of Charleston, May 11, 1780.

2. HUGER, FRANCIS KINLOCH (1774–1855), was born near Georgetown, S. C., in 1774. He was the son of Maj. Benjamin Huger, on whose plantation Lafayette first landed in 1777. He studied medicine and was a pupil of the celebrated John Hunter, of London. While at Vienna, in 1798, he took part in Dr. Eric Bollman's attempt to liberate Lafayette from imprisonment at Olmutz. This attempt having miscarried, Huger was himself imprisoned, but was soon released. Returning to the United States he was made a captain in the army. He afterwards served in both branches of the State legislature. In 1812 he was appointed lieutenant-colonel of an artillery regiment, and in 1813 adjutant-general. He died at Charleston, S. C., Feb. 15, 1855.

3. HUGER, BENJAMIN, an American general, son of the preceding, was born at Charleston, S. C., in 1806. He graduated at West Point in 1825, entered the artillery service, and became captain of ordnance, May 30, 1832. He was chief of ordnance to Gen. Scott's army in the Mexican war, and received several brevets. He became major, Feb. 15, 1855, and resigned April 22, 1861. Entering the Confederate service he was made brigadier-general, and employed at and near Richmond. When McClellan entered on his Peninsular campaign, Huger, now major-general, held Norfolk. A few regiments were sent from Fortress Monroe to capture the place, and Huger quickly withdrew, May 10, 1862, having first fired the navy-yard, the Merrimac, and other vessels. Huger commanded a division at Fair Oaks, May 31, and at Malvern Hill, July 1, 1862. An inquiry having been instituted into his abandonment of Norfolk, he was retired from service. After the war he became a farmer in Virginia.

HUGGINS, WILLIAM, an English astronomer, was born at London, Feb. 7, 1824. He was educated in that city and became proficient in natural science. He devoted himself for some years to the study of physiology with the aid of the microscope. In 1855 he erected and equipped an observatory at his residence at Upper Tulse Hill, with a view of applying to astronomy his practical knowledge of other branches of physics. Obtaining in 1858 a telescope of 8 inches aperture from Alvan Clark, he made careful observations of double stars and accurate drawings of planets; then in 1862, having mapped the spectra of 26 chemical elements, observed the spectra of the planets, stars, and nebulæ. By comparison of these spectra he discovered the nature of these bodies, showing that certain nebulæ are chiefly composed of hydrogen, and that certain comets have the same spectrum as carbon. He went on to determine by the spectroscope whether the fixed stars are approaching or receding from the earth, and with what velocity, and even to measure the heat received from them. His remarkable and valuable researches obtained for him in 1870 the degree of LL. D. from the University of Cambridge, and that of D. C. L. from the University of Oxford. The Royal Society showed its appreciation of his labors by presenting him with a telescope of 15 inches aperture. Every learned society in Europe has conferred on him marks of honor. From 1876 to 1878 he was president of the Royal Astronomical Society of Great Britain.

HUGHES, JOHN (1797–1864), an American Archbishop, was born at Annaboghan, County Tyrone, Ireland, June 24, 1797. He emigrated to America in 1817, and was employed for a time as a gardener. He was educated at Mount St. Mary's College, Emmitsburg, Md., supporting himself by taking care of the college garden for a time, and afterwards was a teacher in the institution. He was ordained both deacon and priest in 1825, and had charge of churches in Philadelphia until 1838. During this time he founded St. John's Orphan Asylum (1828), established the *Catholic Herald* (1833), and conducted noted controversies with Rev. John Breckinridge, D. D., in 1830 and 1834. These discussions were published by both parties. In 1838 Dr. Hughes was made coadjutor to Bishop Dubois, of New York, with the title of bishop of Basilopolis *in partibus*, and in 1842 he became bishop of New York. In 1839 he visited France, Austria, and Italy to obtain pecuniary aid for his diocese. He purchased property at Fordham, in Westchester county, and opened there in 1841 St. John's College and the Theological Seminary of St. Joseph. He had already made open attacks on the public-school system of New York as sectarian. He now organized the Roman Catholic population against it, and instituted a complete system of parochial schools. He also used great exertions to effect a change in the tenure of church property. Previously the property of all religious denominations had been held by lay trustees, but in spite of opposition Bishop Hughes succeeded in having the title to that of the Roman Catholic Church vested in the bishop. The archbishop collected and published the letters of the controversy which he had had with Hon. Erastus Brooks in regard to this change. In 1850 the diocese of New York had been so increased by immigration and other causes that Bishop Hughes was made archbishop, and suffragan bishops were appointed to assist in the administration of affairs. In 1854 the first provincial council of New York was held, attended by seven suffragan bishops. In 1861 Archbishop Hughes and Thurlow Weed were sent by Secretary Seward as special commissioners to Europe to counteract the representations of secession agents in influential circles, and to set fairly before foreign governments the true object of the United States in conducting the war. The archbishop continued to use his influence in behalf of the integrity of the Union. In 1863, when draft-riots broke out in New York, he urged upon the excited people the duty of submission to the government. He died at New York, Jan. 3, 1864. His *Writings* have been published in 2 volumes, and his *Life* was written by J. G. R. Hassard (1866).

HUGHES, ROBERT BALL (1806–1868), an English-American sculptor, was born at London, Jan. 19, 1806. At a very early age he showed aptitude for art, and while a student with E. H. Bailey won several prizes and medals. He made busts of George IV. and the Dukes of York, Sussex, and Cambridge. In 1829 he removed to New York, where he made a marble statue of Hamilton, the first work of the kind in America. It was placed in the Merchants' Exchange, New York, and was destroyed in the great fire of 1835. He made the monumental alto-relief of Bishop Hobart, in Trinity Church, New York, and a bronze statue of Dr. N. Bowditch, at Mount Auburn Cemetery, Boston. He also made a bust of Washington Irving, a statuette of Gen. Warren, a model for an equestrian statue of Washington, and several minor works. He died at Boston, March 5, 1868.

HUGHES, THOMAS, an English author, was born at Donnington, near Newbury, Berkshire, Oct. 20, 1823. He was educated at Rugby and Oriel College, Oxford, where he graduated in 1845. He studied at Lincoln's Inn, and was called to the bar in 1848, and practised as an advocate. His story, *Tom Brown's School-Days* (1856), gave him immediate fame. It is an admirable picture of life in the great English public schools, and an affectionate tribute of the author to the memory of his own instructor, the great Thomas Arnold, of Rugby. Hughes continued his story in *Tom Brown at Oxford* (1861), but this, though well done, was less successful. Between the two he published *The Scouring of the White Horse* (1858). Pursuing his profession he became queen's counsel in 1869. He also took part in politics as a liberal, and became a member of Parliament, representing Lambeth from 1865 to 1868, and Frome from 1869 to 1874. He has always taken great interest in movements for the improvement of the working classes and was principal of the Workingmen's College in London, in which instruction is given in the evenings. In 1880 he established in a remote district of Tennessee a colony called Rugby; intended especially as a haven for young persons from the English middle classes who found difficulty in obtaining employment at home. But it has failed to accomplish its chief object, life in the wilderness having but few attractions for those accustomed to the comforts of civilization. The basis of Mr. Hughes' character, manifest in all his acts and writings, is a profound belief in Christ and an earnest endeavor to apply Christ's teachings in every-day life. He has published in enforcement of his views *The Manliness of Christ* (1879), and as an example of a Christian life *A Memoir of Daniel MacMillan* (1882).

HUGO, VICTOR MARIE (1802–1885), was born at Besançon, in the Maison Barette, Place St. Quentin, Feb. 26, 1802. His father was Joseph Léopold Sigisbert Hugo (1774–1828), and although Victor Hugo has hinted at the antiquity of his family, even suggesting that Hougoumont on the field of Waterloo was originally *Hugo mons*, and belonged to his ancestors, there is no record by which these hints can be verified. His mother, Sophie Trébuchet, was the daughter of a ship-owner of Nantes. Victor, at birth, was so small and sickly that it was thought he would not live. His father's military career took him first to Italy, where he served under Joseph Bonaparte, was governor of Arellino, and captured the brigand Fra Diavolo, and then to Spain. His wife and children followed him, and those early impressions of Italy and Spain seem never to have left the poet. Thus the first Spanish town in which he stopped on the way to Madrid was Ernani, and among the instructors at the College of Nobles, which he and his brothers attended at Madrid, was a hunchback named Corcova, from whom grew *Quasimodo* and *Triboulet*. In 1812 Madame Hugo returned to Paris and settled again at the deserted convent of the Feuillantines, where during 1808–11 Victor's childhood had been spent, and where he had had for instructor General Lahorie, a proscribed conspirator who was finally tracked to this hiding-place and shot. Larivière, a former priest, also had a share in Victor's education at that time. The downfall of the Bonapartists in Spain cut off the salary of General Hugo, who had been created count and aide of King Joseph, and obliged his family to move into smaller quarters. Victor was a great reader, taking especial delight in Capt. Cook's *Voyages*, and, like the youthful Goethe, amused himself with mimic theatrical performances. In 1815 he entered the boarding-school of M. Decotte, where he remained for three years, attending also lectures at the Collège Louis-le-Grand. Many copy-books filled with poems on many subjects and in many styles—including a drama, *Irtamène*, written at fourteen, and *Iñez de Castro* at sixteen—prove that the boy was already instinct with poetic emotions. The author of the *Génie du Christianisme* was then Victor's hero: "Je veux être Châteaubriand ou rien," he wrote in his diary, July 12, 1816, and he preferred reading that heavy work rather than studying mathematics. In 1817 he competed for the prize offered by the Academy for the best poem on "The Advantages of Study." The Immortals hardly believed that his 320 verses were the work of a boy of fifteen; his precocity astonished literary Paris and earned him the acquaintance of many literary magnates. Châteaubriand called him "a sublime child" and invited him to his house; Neufchâteau, another Academician, petted him, and appropriated a criticism prepared by him on *Gil Blas*. In 1819 Hugo took two prizes for poetry at the Floral Games of the Academy of Toulouse, writing upon *The Virgins of Verdun* and *The Statue of Henry IV.*; the next year his *Moses on the Nile* was also successful.

By this time he was fairly launched in literature. After the Restoration his mother and he lived permanently at Paris, and he echoed her strong royalist and Vendean politics; Comte Hugo, whose previous republican and Bonapartist record deprived him of Bourbon favors, lived in retreat at Blois. Victor, in 1820, joined his brother Abel in editing *Le Conservateur Littéraire*, in which first appeared *Bug Jargal*. He was already in love with Adèle Foucher, but both were too poor to think of marrying. Just at this time the death of his mother, to whom he was devotedly attached, wrought a gradual change in his views, political and religious, although it must be admitted that in religion that admirable and strong woman wished her sons to think for themselves. For a year Victor lived in great straits, having only 700 francs. Then the publication of *Hans d'Islande* (1823), a grotesque novel, preceded by the collection of *Odes* (1822), assured him a prominent position among the young generation of writers. In October, 1822, he had married, and shortly after Louis XVIII. bestowed upon him an annual pension of 1500 francs, thereby encouraging, as he thought, talents which should bring glory to Bourbonism. But Hugo was hurrying towards opposite opinions. He felt the inspiration of Romanticism more deeply than any of his associates, and was soon looked up to as their leader. In 1826, when *Bug Jargal* was published, it was extolled by *Le Globe*, the organ of the Romantics, which had then a corps of contributors of unrivalled strength, who were pushing the war upon the "Classics" to a crisis. This vast literary movement cannot be more than referred to here. It represented the reassertion of the individual; the refusal to bow before authority based only on tradition; the declaration that the nineteenth century should choose its own methods and use its own voice instead of mimicking the methods and voices of other ages. In Germany, Goethe, Lessing, and Schiller had already emancipated their literature; in England, Wordsworth and Coleridge, followed by Byron and Shelley, had at last got the mastery over the imitators of the imitative Pope, but in France the contest was still undecided. The "Golden Age" of French literature belonged to the artificial reign of Louis XIV., so that the models to be followed—especially in the drama—required obsequious observance of the "three unities," of time, of place, of theme. Moreover, the French Academy, always ready to place an elephantine foot upon non-academic productions, was particularly conservative in the first decade of this century. Finally the political reaction after the fall of Napoleon extended to literature, and delayed by several years the expression in literary form of the spirit which had impelled the Revolution of 1789. To these causes may be attributed the retardation in France. Although Victor Hugo's early poems had proceeded from no conscious rebellion against the old school, and although he was a legitimist at heart, it is easy now to see in their grace, variety, and naturalness an intuitive predilection for Romanticism. Another instalment of *Odes* and the *Ballades* in 1826 fixed the impression made by his earlier works. By this time he was an open and vigorous champion of the new school. In a long preface to *Cromwell* (December, 1827,) he boldly preached the new gospel. We have the account of a dinner at which Hugo sat beside Talma and recited to him scenes from this then unpublished drama, which converted the great actor to the young poet's views; but Talma died too soon to act in any of Hugo's plays. *Cromwell* was not intended for the stage. *Amy Robsart* (1828), based upon *Kenilworth*, and written in collaboration with Ancelot, was hissed after one representation at the Odeon.

Then follow three years of wonderful fertility and triumph. In January, 1829, appeared *Les Orientales*, a volume of lyrics in which the poet's rich genius is fully developed. Three weeks later a pamphlet, *Le Dernier Jour d'un Condamné*, contained the first of many vehement protests against capital punishment. In twenty-four days of June he wrote his third drama, *Marion de Lorme* (first entitled *Un Duel sous Richelieu*). An imposing gathering, in which were Balzac, Dumas, and Alfred de Musset, listened to Hugo's reading of this piece, and applauded without reserve. The chance of presenting it on the stage was not lacking, but the Polignac Ministry and Charles X. then ruled. M. Hugo was invited to confer with the censor, Martignac, who pretended to discover disloyal allusions in the 4th act. Hugo declared that the words used by the king in the drama had no political significance. Nevertheless, Charles X., who also summoned the poet to an interview, prohibited the representation, but tried to conciliate Hugo by offering to increase his pension to 6000 francs—an offer which he refused. Not discouraged, Hugo soon produced another drama, *Hernani, ou l'Honneur Castillan*, which was performed at the Théâtre Français, February 25, 1830. The story of that Saturday night has been often told. "Classics" and "Romantics" foresaw that the supreme hour was at hand. The former rallied to hiss; the latter, wearing red badges with the watchword *hierro*, which Hugo had distributed among them, crowded to applaud. The boxes were filled by persons distinguished in rank, letters, or art, who joined in the tumult of the partisans in the pit. Many of the "Romantics" decked themselves in extravagant costumes—Théophile Gautiér's scarlet waistcoat became famous—and as the piece proceeded and the champions of Hugo and *Jeune France* were victorious the disorder grew. In the entr'actes verbal quarrels led to blows. Mlle. Mars, then 51 years old and not in sympathy with Romanticism, played Doña Sol; Firmin was Hernani. The press, with the exception of the *Journal des Débats*, condemned the drama, but it could not be crushed, and for two months it was repeated, often amid storms like that of the first night. The Cénacle, or club of "Romantics," now ruled French literature and Victor Hugo ruled the Cénacle, whose head-quarters were his rooms in the Place Royale. He and his colleagues were called barbarians by the "Classics." "We accept the comparison," rejoined P. de Saint-Victor. "Where Attila passed, the grass grew no more; where Victor Hugo, Lamartine, Saint Beuve, Théophile Gautier, George Sand, Alfred de Musset have passed the mournful thistles and the artificial flowers of the pseudo-classics will never sprout again." Almost immediately another volume of poems, *Les Feuilles d'Automne*, appeared to widen Hugo's fame. Victorious in lyric and dramatic poetry he next conquered the headship in romance. On July 27, 1830—just before the Revolution exploded which blew Charles X. into exile—he began a semi-historical novel, placing the scene at Paris in the reign of Louis XI. On Jan. 14, 1831, his story and the bottle of ink he had used in writing it were ended together—a coincidence which suggested the title, *Ce qu'il y a dans une bouteille d'encre.* A month later the work was published under the name *Notre Dame de Paris.* This great work fairly represents the strength and weakness of Victor Hugo's genius. Here are chapters of tempestuous passion followed by chapters of dry and inaccurate history or archæology. Here is the tremendous guilt of the villain, Frollo, contrasted with the exquisite simplicity and naiveté of Esmeralda. The shadows are all the blacker from the intense light. No one but Victor Hugo would have hazarded the minute description of Frollo's death, and no one but him could have created Quasimodo, that reformed Caliban to whose brutal instinct of ferocity has been added the instinct of love. In *Notre Dame de Paris*, as in all of Hugo's characteristic work, we find amazing instances of his lack of humor—that safeguard against extravagance and bombast. In one place he describes one of the characters as pulling out his hair by handfuls to see if it was turning white in the agony he was suffering! In another place an unfortunate attempts to wrench his head from his shoulders in order to dash it to the ground! Evidently, the author sometimes misses the sublime and plunges into the ridiculous. But in spite of its defects there are few novels that make so deep an impression on the reader as *Notre Dame de Paris:* it is one of the books about which it is impossible to remain indifferent. Critics gave it but faint praise when it appeared, but it sold rapidly and has long been familiar wherever European languages are read. In 1832, in the 8th edition, Hugo added the chapters, "Impopularité," "Abbas Beati Martini," and "Ceci tuera cela."

Thus successful in the field of romance, Hugo now devoted himself once more to the theatre. Under the new king the censorship was relaxed and *Marion de Lorme* was produced at the Porte St. Martin Theatre, Aug. 11, 1831. Madame Dorval played the part of the heroine; M. Bocage that of Didier. The tumultuous scenes of 1830 were repeated: "Classics" hissed and groaned; "Romantics" applauded and cheered. *Marion de Lorme* was successful—having a run of 63 nights—although in a smaller degree than *Hernani.* On June 1, 1832, Hugo began *Le Roi s'Amuse* and, writing with his usual speed, it was soon finished and given to M. Taylor, director of the Comédie Française, where it was at once put in rehearsal. The parts were distributed as follows: Triboulet, M. Ligier; St. Vallier, M. Joanny; François I., M. Perrier; Blanche, Mlle. Anaïs. Shortly before the opening performance, M. d'Argout, Minister of Public Works, informed Hugo that certain passages in the drama savored of disloyalty. Hugo replied that what he had written had no reference to Louis Philippe but to Francis I. On Nov. 22, 1832, the play was produced. The author's partisans sang the "Marseillaise" and the "Carmagnole." His enemies were louder than ever. To add to the confusion the report spread that the king had been shot. On the morrow critics denounced *Le Roi s'Amuse* as indecent, monstrous, horrible, seditious. Louis Philippe was worked upon by politicians and academic "Classics," and an order was issued forbidding a repetition. Victor Hugo then replied in a manifesto, defending his play against the charge of immorality. Two lawsuits were brought, one by him against the Comédie Française for failing to fulfil its contract; the other by the management of the theatre against the Minister of Public Works for compensation. Needless to say, when freedom of speech is controlled by government censorship, the government will take care that courts of justice shall support itself: judgment was rendered against the poet and the theatre. This rebuff discouraged neither Hugo nor his friends, and in a few weeks his prose drama *Lucrèce Borgia* was in rehearsal at the Port St. Martin Theatre under the direction of M. Harel. The cast on the first night (Feb. 2, 1833) included M. Frédéric Lemaître as Gennaro; M. Delafosse as Alfonse d'Este; Mlle. Georges as Lucrèce Borgia, and Mlle. Juliette as Princesse Negroni. Victor Hugo has written as follows in regard to these two plays which were begotten almost simultaneously in 1832: "Embody a mother even within a monster, and the monster will not fail to excite interest, and perhaps sympathy. Physical deformity, sanctified by paternal love, this is what you have in *Le Roi s'Amuse;* moral deformity, purified by maternal love, this is what you find in

Lucrèce Borgia." At the same theatre, on Nov. 6, 1833, was presented *Marie Tudor* (originally entitled *Marie d'Angleterre, ou Souvent Femme Varie*), with Mlle. Georges again in the leading part. That admirable actress, although 47 years old, still divided with her elder rival, Mlle. Mars, the honors of the Parisian stage; it was in this very year that the Jewish girl who was destined to succeed and surpass them both entered the Conservatory. *Marie Tudor* was successful, and was followed on April 28, 1835, by *Angélo, Tyran de Padoue*, at the Théâtre Français, Mlle. Mars and Mme. Dorval appearing in the chief rôles. Victor Hugo now returned to verse—*Marie Tudor* and *Angélo* are in prose—and wrote the libretto of an opera called *Esmeralda*, the story being borrowed from *Notre Dame de Paris.* Mlle. Bertin, daughter of the editor of the *Journal des Débats*, composed the music for this piece, which failed at its production at the Royal Academy, Nov. 14, 1836. At the new theatre of the Renaissance, on Nov. 8, 1838, was brought out the last of Hugo's successful dramas, *Ruy Blas*, which ran for fifty nights, with Lemaître as the lackey-lover. His vogue began to grow dim; the public was used to his victories, and younger men, taught in his school, received attention. He tried once more, however, in his trilogy, *Les Burgraves*, to compel admiration. This work was produced at the Comédie Française, March 8, 1843, and withdrawn after 30 representations. Thenceforward, Victor Hugo invariably refused to give any new piece to be performed during his life, although he did not relinquish dramatic writing. *Torquemada*, *La Grand'mère*, *L'Épée*, *Peut-être Frére de Gavroche*, and a pantomime in which trees and flowers talk, *La Forêt Mouillée*, must be added to his work as a dramatist. Of these *Torquemada* was published in 1882.

During this remarkable period of fifteen years between the publication of *Cromwell* and the production of *Les Burgraves*, Victor Hugo's energy was incessant. Besides the works mentioned, he published in 1834 an essay upon Mirabeau. In 1835 *Les Chants du Crépuscule* appeared. The lyrics in this volume are less glowing and fanciful than those in *Les Orientales;* the poet has left the East, where his imagination wandered freely among gorgeous colors and beautiful objects, and he now faces the realities of life in a period when doubt prevails, and no man can say whether the twilight will deepen into night or brighten into morning. Two years later, in *Les Voix Intérieures*, he offered variations on this theme. He dedicated the volume to his father, "Joseph Léopold Sigisbert, Count Hugo, a name inscribed on the Arch of Triumph de l'Étoile." *Les Rayons et les Ombres* (1840) completes what has been called his *gray* manner. These volumes of lyrics cannot be matched in French poetry, either for variety or melody, for power or delicacy. A tour into Germany resulted in a book of travel, *Le Rhin* (1842).

In France, since 1789, all paths lead to politics; the poet, the artist, the general, the journalist, if he achieve but the smallest success in his calling, is almost sure to be drawn into the whirlpool of public affairs. It is not surprising that Victor Hugo, whose plays had kindled political as well as literary wrangling, and who was ambitious to shine as a statesman, hailed the opportunity by which he expected to take his place among his country's law-makers. After his mother's death he outgrew the Bourbon doctrines in which he had been brought up, but not before he had addressed an eulogistic ode to Charles X., whom he subsequently despised. Then followed a period during which he fell under the spell of the Napoleonic legend, when he admired the glory which Frenchmen, while serving Napoleon, had won for France, but this admiration for the past did not prevent him from accepting the reign of Louis Philippe. In 1836 Victor Hugo was a candidate to the French Academy, not only because his election to that body would confer an official recognition upon his literary fame, but also because it was the stepping-stone to the peerage. He was defeated by Dupaty, an obscure person, whose qualifications were meagre. "I always thought," said Hugo, "that the way tothe Academy was across the Pont des Arts; I find that it is across the Pont Neuf." In 1839 he was defeated by Molé, ex-premier, and in 1840 by Flourens, now forgotten. At length, in 1841, he was elected in place of Népomucène Lemercier. Among those who voted against him were Delavigne and Scribe. Balzac retired from the candidacy, rather than lessen the chances of his friend, and was never made an "immortal." Victor Hugo took his seat June 3, 1841. Four years later, April 13, 1845, he was made a peer. In the Chamber he spoke in favor of literary and artistic copyright; in behalf of Poland, of coast defences, of the petition of Jerome Napoleon Bonaparte to be allowed to return to France. When the Revolution of 1848 sent Louis Philippe into exile, Victor Hugo supported the republic as a means to liberty. In June he was elected to the assembly, his name standing on the list between those of Leroux and Louis Napoleon. Although nominally a member of the Moderate party, he soon discovered democratic preferences to which he had long been tending. Of the insurrection of June he wrote afterwards: "The very thing that made it terrible was that it demanded respect. It was the outcome of a people's despair. The first duty of the Republic was to suppress the revolt; the next was to pardon it." This was the attitude held by Victor Hugo towards the Communists of 1871. On August 1, 1848, he started *L'Événement*, P. Meurice, Théophile Gautier, Vacquerie, A. Vitu, and Charles and François Hugo being its foremost contributors. This journal hinted at Victor Hugo as the proper candidate for the presidency. In the Legislative Assembly he came out boldly as a democrat and socialist. As president of the Peace Congress—Cobden was vice-president—(Aug. 21, 1849), he denounced French intervention at Rome. Frequent were his oratorical contests during the next three years, memorable among them being his replies to Montalembert,(who charged him with deserting the principles of his younger days, and taunted him by quoting from Hugo's Bourbon odes,)and his stubborn opposition to the re-election of Louis Napoleon. The *coup d'état* put Hugo's name at the head of the proscribed; 25,000 francs were offered for his capture, dead or alive; and, after being concealed for five days in the house of a royalist marquis, he escaped to Brussels in the disguise of a workman.

There began an exile which proved the genuine nobility of Hugo's character. Between December, 1851, and May, 1852, he wrote *L'Histoire d'un Crime* (published in 1877), and *Napoléon le Petit* soon followed it. The publication of this terrific satire caused the passage of the Faider law, by which Hugo was compelled to leave Belgium. On Aug. 5, 1852, he landed at Jersey, where his home was, at Marine Terrace, until 1855, when the English government—then in alliance with Napoleon III.—requested him to depart. He settled at Hauteville House, on the island of Guernsey. In 1853 *Les Châtiments* renewed in verse the attack upon the emperor. In spite of police scrutiny thousands of copies of this work were introduced into France. Hugo's income was reduced to 7000 francs at the time of his exile, and in spite of the large sale of these satires he realized little from them; but in 1856 he was more fortunate with *Les Contemplations*, a poetical record in two volumes of the poet's life, chiefly previous to 1843. In 1859 came the first part of *La Légende des Siècles*, a vast epic work whose aim it is to describe the progress of the human race from the days of Adam to the French Revolution, by presenting typical pictures of each epoch. In 1862 *Les Misérables* was issued simultaneously in Paris, Brussels, London, New York, Milan, Leipsic, Antwerp, Madrid, Warsaw, Pesth, and Rio Janeiro. This is Hugo's master-piece in prose. It consists of five volumes, entitled: *Fantine*, *Cosette*, *Marius*, *L'Idylle Rue Plumet et l'Épopée Rue Saint-Denis*, and *Jean Valjean*. The author wrote: "It is a sort of planetary system, making the circuit about one giant mind that is the personification of all social evil." The success of this colossal work was instantaneous; no other book has since created so immediate and profound an international sensation. In 1866 *Les Travailleurs de la Mer*, with Guernsey and fisher-folk for its background and characters, appeared. In 1869 *L'Homme Qui Rit* followed, but it fell far below its predecessors. Whilst engaged with these productions Hugo was also writing his prose rhapsody on *William Shakespeare*, which served as a preface to his son's translation of Shakespeare into French (1864), and his *Chansons des Rues et des Bois* (1865), a collection of light and beautiful verse. From his retreat Hugo's voice was often heard in behalf of the oppressed. He appealed to the United States to save John Brown's life; to Juarez to spare Maximilian; to Europe to aid the Cretans; to the Spaniards to cease persecuting the Cubans. His life-long opposition to capital punishment evoked many passionate pleas from him. Besides *Le Dernier Jour d'un Condamné* (published in 1829; reprinted with a preface in 1832), he published *Claude Gueux* (1834); interceded for A. Barbès, 1839; for Joseph Henry, 1846, and Lecomte, 1847, who had fired at the king; spoke in favor of the abolition of capital punishment, in the Assembly, 1848; defended his son Charles, who had been arrested for condemning, in his newspaper, an execution, 1851—this being one of Hugo's finest orations. More recently he begged for the lives of nihilists, socialists, anarchists, and Irish invincibles. At the time of the Universal Exposition at Paris the emperor allowed *Hernani* to be performed at the Théâtre Français, and the occasion was made a triumph of the exiled poet by his friends. The popularity of the drama proved its vitality. In 1869 the Empire was beginning to be sensible of the hostility of its republican enemies, whom Hugo encouraged from his island refuge. *Le Rappel* newspaper was founded by the men who had managed *L'Événement* in 1848, assisted by Henri Rochefort and by contributions from Hugo.

At last the ignominy of Sédan recalled the patriot from banishment. On Sept. 5, 1870, he re-entered Paris. He issued almost immediately an address to the Germans, bidding them to come to Paris, but as friends. "This war does not proceed from us," he wrote. "It was the Empire that willed the war; it was the Empire that prosecuted it. But now the Empire is dead, and a good thing, too! We have nothing to do with its corpse; it is all the past; we are the future. . Pause awhile before you present to the world the spectacle of Germans becoming Vandals, and of barbarism decapitating civilization. Victory will not be for your honor." But the Germans did not pause; their armies rapidly conquered French territory and invested Paris. On Sept. 17 Hugo issued an appeal to his countrymen to rise and arm. At the general election on Feb. 8, 1871, he was elected representative for the department of the Seine, being second among 43 candidates. He acted with the extreme Left; opposed the ratification of peace and the cession of Alsace and Lorraine; and, on March 8, being interrupted in the tribune whilst defending Garibaldi, he resigned from the assembly. Ten days later he escorted to Paris the body of his son Charles, who had suddenly died, and thence proceeded to Brussels, where he abode during the Reign of Terror. When the Communists were worsted by the troops from Versailles, Hugo offered them a refuge in his house—an offer which caused a Brussels mob to attack his dwelling. Expelled from Belgium he shortly returned to Paris. At the election in July, and again in December, he was beaten at the polls, but his active sympathy was constantly given to the Radicals. In 1876 he was elected life-senator, sitting with the extreme Left. He supported a measure for extending amnesty to the condemned Communists, which was rejected, and favored colonization. When it became evident that MacMahon was intriguing with Bonapartists for a return of the Empire, he published *L'Histoire d'un Crime* to refresh the memory of the Napoleonic crime of 1851. During the last years of his life Victor Hugo was the idol of Paris. Placed above political parties and literary cliques, his countrymen accepted him as their national hero. If his views upon public affairs were too vague or extravagant to be followed, the patriotism that inspired them was unassailable. His later works were *Actes et Paroles* (1876), a further contribution in prose to the understanding of his political career and creed; *L'Année Terrible* (1872), a record in verse of the horrors of the war and of the siege of Paris; *La Libération du Territoire* (September, 1873), a poem, and *Pour un Soldat* (1875), a pamphlet, for the benefit of the people of Lorraine and Alsace; *Quatre-vingt-treize* (1874), his last powerful romance, dealing with Britany in 1793, published simultaneously in seven or eight languages; the second part of *La Légende des Siècles* and *L'Art d'être Grand-père* (1877), a charming volume of verse, in which the poet's love for children is immortalized; *Le Pape* (1878), a picture of an ideal spiritual sovereign; *La Pitié Suprème* (1880), a further plea for tolerance; *L'Ane* (1880), a satire aimed at pedantry; *Les Quatre Vents de l'Esprit* (1881–83); *Torquemada* (1882), a drama; and *L'Archipel de la Manche.* On the fiftieth anniversary of *Hernani* (Feb. 25, 1880), a jubilee performance was given at the Comédie Française, Hugo's bust being crowned by Sarah Bernhardt, who enacted Doña Sol. Again, at the completion of his 79th year, Feb. 27, 1881, the poet was fêted by multitudes of his admirers, including a procession of children, at his residence in the Avenue d'Eylau. He retained his health and activity until within a few days of his death, which occurred Friday, May 22, 1885, of congestion of the lungs. He was given a state burial at the Pantheon ten days later, and not even Paris, the home of vast pageants, ever conducted so stupendous a public spectacle. Victor Hugo left 100,000 francs to the poor of Paris, and bequeathed his manuscripts to the Bibliothèque Nationale. His fortune was estimated at 5,000,000 francs. It is understood that several volumes of his posthumous works will eventually be published.

Of Victor Hugo's place in the world's literature it is still too early to speak. No other author while living—not even Petrarch, or Voltaire, or Goethe—achieved such unbounded national popularity as his. In romance he stood first, although his rivals were George Sand and Balzac; in lyrical poetry he stood first, in spite of Lamartine and Alfred de Musset; in the drama he had no near competitor. He gave to French rhythm a strength and variety it had never known, and invented a prose style which is singularly effective when used by him. His range of character-creation is very broad. He depicts the immensity of the ocean, the battle of Waterloo, the horrors of the Vendée, the innocent prattle of little children, with equal mastery. He possessed the genius of emotion to the highest degree; of reflection, of wisdom, he had but little. Hence the strange unevenness in his works, their inaccuracy and exaggeration. Controlled wholly by impulse, he lacked a corrective sense of humor, which might have dissipated his egotism. He seems the supreme embodiment of the Gallic type; versatile, mercurial, enthusiastic, delighting in the half-truths of the epigram, demanding brilliance at any cost, readily imbibing new ideas and embarking on new schemes, sympathizing with those who suffer, and sincerely rhetorical. In his works he is always the eloquent and fearless advocate pleading in behalf of the downtrodden—the champion of the outcast against society which has cast them out. He has the brilliance and eloquence and sometimes the sophistry of the special pleader. A true orator, he knows the magic which sways the heart, if not the head. Whatever may be the value of this power as compared with the impersonal majesty of Shakespeare or Sophocles, Victor Hugo's endowment of it is unmatched. Be it further recorded that his impulses were ever noble: he refused pensions from Bourbons and soft promises of amnesty from Napoleon III. rather than sell his freedom of speech; he succored the distressed; and forgave all enemies except those of liberty. And in an age when his ablest contemporaries treated chastity and the ties of family with contempt, he was steadfastly on the side of morality. His creed was deistic—he believed in immortality. He belongs with Montaigne and Molière at the head of French literature.

Victor Hugo's father died in 1828; his wife in 1868. He had two brothers: Abel (1798–1855), a writer upon historical and literary subjects, and Eugène (1801–1837), who wrote verse. Victor Hugo had three children: Leopoldine, who was drowned with her husband, Charles Vacquerie, at Villequier, Sept. 4, 1843, a few months after their marriage; Charles (1826–1871), and François (1828–1873), whose *Ile de Jersey* (1857) and *Œuvres Complètes de Shakespeare* (1864) entitle him to a place among the less conspicuous French writers of the last generation. Victor Hugo's living descendants are his grandson, Georges, and his granddaughter, Jeanne, children of Charles Hugo, whose widow married M. Charles Lockroy.

A vast amount of material exists for the study of Hugo's career. Besides his autobiographic works, above mentioned, his wife wrote *Victor Hugo Raconté par un Témoin de sa Vie* (2 vols.), in which the first forty years of his life are related; *Victor Hugo et Son Temps*, by Alfred Barbon, and *Victor Hugo chez lui*, by Gustave Rivet, are the works of Hugolaters. The works of Sainte-Beuve, Jules Janin, Lamartine, and, indeed, of all the participators in the romantic movement, may be consulted. In English there are essays by G. H. Lewes, F. H. W. Myers, John Morley, Lady Pollock, A. C. Swinburne, A. R. Spofford, Leslie Stephen, Henry James, E. Dowden, G. Saintsbury, John Burroughs, H. H. Boyesen, and many others. In Spanish Castelar, in Italian Edmondo dé Amicis, etc. Hugo's dramas and romances have furnished the plots of many libretti. (W. R. T.)

HULL, Isaac (1775–1843), an American commodore, was born at Derby, Conn., March 9, 1775. His father had been an officer in the Revolution. Isaac having entered the merchant service, had command of a vessel to London at the age of 19. In 1798 he entered the U. S. navy as lieutenant. In 1800 he manned a small sloop from the U. S. ship Constitution, ran into Port Platte, Hayti, and captured a French letter-of-marque. He then landed and spiked the guns of a battery on shore, before its commander could prepare for defence. He afterwards distinguished himself in the attacks on Tripoli, assisted Gen. Eaton in capturing Derne, and in the Bay of Naples protected American vessels against the French. In April, 1806, he was made captain. When the war of 1812 opened Hull had command of the frigate Constitution of 54 guns, and in July, while cruising off New York, was pursued by a British squadron of five vessels, but by splendid seamanship escaped them, after a chase of nearly three days and nights. Spending a few days in Boston harbor, he sailed again on Aug. 2, and on Aug. 19 encountered the British frigate Guerriere of 49 guns, Capt. Dacres. The latter hove to for an engagement, and commenced firing at 5 P. M. An hour later the ships grappled, and after half an hour's hard fighting the Guerriere surrendered, having been reduced to a wreck. When she began to sink on the next day the prisoners were removed, and the vessel being set on fire soon blew up. In this action the Constitution suffered chiefly in her rigging; her loss in killed and wounded was only 14, while that of the Guerriere was 79. This being the first naval action of the war, created a great sensation. Capt. Hull was enthusiastically received on his arrival in Boston. Congress ordered a gold medal to be presented to Capt. Hull, silver medals to each commissioned officer under him, and $50,000 to the crew. After the war Hull was a naval commissioner, and also had command of the navy-yards at Boston, Portsmouth, and Washington. In October, 1842, he took up his residence at Philadelphia, and died there Feb. 13, 1843.

HULL, William (1753–1825), an American general, was born at Derby, Conn., June 24, 1753. He graduated at Yale College in 1772, studied divinity for a year, then turned to law, and was admitted to the bar in 1775. He was appointed captain in a Connecticut regiment, and joined the American army at Cambridge. He fought at White Plains, Trenton, and Princeton, and after the latter was promoted to be major of a Massachusetts regiment. He was afterwards engaged at Ticonderoga, Stillwater, Saratoga, Monmouth, and Stony Point. He was made lieutenant-colonel in 1779, and was an inspector under Baron Steuben. For his expedition against Morrisania in January, 1781, he received the thanks of Congress. He was present at the surrender of Cornwallis, and was afterwards sent to Quebec to demand the surrender of Niagara, Detroit, and other Western posts. After the war he practised law at Newton, Mass., and was prominent in the Massachusetts legislature. He was also major-general of the State militia, and in Shays' rebellion commanded the left wing of Lincoln's troops. By a forced march through a snow-storm he surprised the insurgents in their camp and dispersed them. In 1798, on his return from a visit to Europe, he was appointed judge of the court of common pleas. In 1805 he was appointed governor of Michigan Territory, and at the outbreak of the war of 1812 he was made brigadier-general and commander of the North-western army, with orders to invade Canada. By mismanagement on the part of the government, the declaration of war had reached the British general, Brock, in Canada, before Hull had received it. The British then surprised and seized the fort at Michilimackinac, and thus brought the hesitating Indian tribes to their side. Hull had crossed into Canada, but afterwards, through distrust of the raw militia who composed his army, retired to Detroit. While half of Hull's force was away getting supplies, Brock crossed the river with over 2000 regulars and Indians and demanded the surrender of Detroit, declaring that he would be unable to restrain the Indians if the place were carried by assault. Hull, knowing the instability of the militia, yielded to his humane feelings and surrendered, thus giving up not only Detroit but also the entire North-west. Col. Lewis Cass, who had commanded a regiment from Ohio, hastened to Washington with the news, and by exaggerated statements produced strong feeling against Hull. The latter was tried by court-martial and condemned to be shot, but Pres. Madison pardoned him in consideration of his past services. In 1814 Gen. Hull published a defence of his conduct, and still later a history of the *Campaign of the North-west Army*, 1812 (1824). He died at Newton, Mass., Nov. 25, 1825. His *Life* was published by his daughter, Mrs. M. Campbell, and by his grandson, Rev. J. Freeman Clarke, in 1848.

HULLAH, John (1812–1884), an English teacher of singing, born at Worcester, June 27, 1812. He studied under Horsley and Crevelli, and in 1836 composed the music for Dickens' opera, *The Village Coquettes*. In 1840, in an effort to popularize the study of music, he established at Exeter Hall his system of singing. St. Martin's Hall was afterwards built for him, but unfortunately was burnt down in 1860. He was professor of vocal music and of harmony in King's College from 1844 to 1874, and in other institutions, and was conductor of the orchestra and chorus at the Royal Academy of Music from 1870 to 1873. From 1872 to 1881 he was musical inspector in the schools of Great Britain. He has done much to improve musical taste and to cultivate a love of music among the people. He, however, opposed the tonic Sol-fa system, which was introduced as an aid for that purpose. Among Mr. Hullah's publications are *A Grammar of Harmony*, *Grammar of Counterpoint*, *History of Modern Music*, *Transition Period of Musical History*. As an acknowledgment of his services in popularizing music, the University of Edinburgh in 1876 conferred on him the degree of LL. D. He died Feb. 21, 1884.

HUMBERT I., Renier Charles Emmanuel Jean Marie Ferdinand Eugene, King of Italy, was born March 14, 1844, being the son of Victor Emmanuel II. (1820–1878) and of Queen Adelaide (1822–1855). He attended his father during the war of Italian independence in 1859, and took part in the reorganization of the government of the two Sicilies, visiting Naples and Palermo in July, 1862. Before war was declared against Austria in 1866 Prince Humbert visited Paris to sound the French government with regard to Italy's alliance with Prussia. When hostilities commenced he took the field, having command of a division in Gen. Cialdini's army, and was present at the disastrous battle of Custozza, June 23, 1866. He was married at Turin, April 22, 1868, to his cousin, Princess Marie Marguerite Thérèse Jeanne of Savoy. His eldest son, born Nov. 11, 1869, is Victor Emmanuel Ferdinand Mary Januarius, and bears the title Prince of Naples. After Rome was occupied in 1870 by the Italian troops, Prince Humbert took up his residence in Rome. He succeeded to the throne of Italy on the death of his father, Jan. 9, 1878. In November of that year an unsuccessful attempt was made to assassinate him, and when the assassin was afterwards condemned to death, the king commuted the sentence to imprisonment at hard labor. By other actions, showing a kind and gentle disposition, he has won the affection of the people, and especially by his sympathy manifested during the epidemic of cholera at Naples in 1884.

HUMPHREY, Heman (1779–1861), an American clergyman, was born at West Simsbury, Conn., March 26, 1779. Having obtained a common-school education he began to teach at the age of sixteen, and afterwards went to Yale College, where he graduated in 1805. He studied theology under Pres. Dwight and was ordained pastor of the Congregational Church at Fairfield in April, 1807. Here he continued ten years and then became pastor of the church in Pittsfield. He was president of Amherst College from October, 1823, to 1845. (See Amherst College, Vol. I.) He then retired to private life, but was a frequent contributor to religious periodicals. He had been one of the pioneers in the temperance reformation, and was a promoter of religious revivals. Among his publications were *A Tour in France, Great Britain, and Belgium* (2 vols., 1838); *Domestic Education* (1840); *Sketches of the History of Revivals* (1859). He died at Pittsfield, Mass., April 3, 1861.

HUMPHREYS, Andrew Atkinson, an American general and engineer, was born at Philadelphia, Nov. 2, 1810. He graduated at West Point in 1831, and entered the artillery service. He distinguished himself in the Florida war and became first lieutenant in August, 1832. He resigned his commission, Sept. 30, 1836, but in July, 1838, was appointed first-lieutenant of topographical engineers. He had charge of the coast survey office from 1845 to 1849, and afterwards began the topographic and hydrographic survey of the delta of the Mississippi. In 1854 he took charge of the office of explorations and surveys in the war department, and gave special attention to the selection of a route for a railroad from the Mississippi to the Pacific. He became major Aug. 6, 1861, and in December, 1861, was placed in the staff of Gen. McClellan. Soon after he was made brigadier-general of volunteers, and in September, 1862, commanded a division at Antietam. He was engaged at the battles of Fredericksburg, Chancellorsville, and Gettysburg, and was chief of staff to Gen. Meade. Being placed in command of the Second corps he was engaged in the siege and capture of Petersburg and the pursuit and capture of Lee's army. At the close of the war he received the brevet of major-general, and in 1866 was again engaged in engineering work on the Mississippi. He was appointed chief of engineers, U. S. A., Aug. 8, 1866. He has served on many important commissions, and has published *The Physics and Hydraulics of the Mississippi River* (1867) and other valuable reports.

HUMPHREYS, David (1752–1818), an American general, was born at Derby, Conn., in July, 1752, being son of Rev. Daniel Humphreys. At the outbreak of the Revolutionary war he entered the army as captain, was aide to Gen. Putnam in 1778, and to Washington in 1780, being then lieutenant-colonel. He distinguished himself at the siege of Yorktown, and being appointed to bear the captured standards to Congress received from it a sword as a testimonial of his services. At the close of the war he accompanied Gen. Washington to Virginia, and in July, 1784, went to France as secretary of legation to Jefferson. Returning to his native town in 1786 he was elected to the legislature, and while at Hartford, in company with Joel Barlow, Hopkins, and Trumbull, published the *Anarchiad.* He was appointed to the command of a regiment for the Western service, and when the troops were not required he visited Washington at Mount Vernon. While here, in 1790, he was appointed minister to Portugal, where he stayed till 1794. After his return to Lisbon in 1797 he was appointed also minister to Spain, and he made treaties with Tripoli and Algiers. Returning to America in 1802 he introduced into this country merino sheep, and established a woollen- and cotton-factory at Derby. As a member of the legislature he was active in 1812 in providing for the defence of the State; he also took command of the State militia. He died at New Haven, Feb. 21, 1818. He was somewhat noted in his day as a poet, publishing among other poems *An Address to the Armies of the United States* (1782), which was translated into French by Chastellux. His writings were collected and published at New York in 1790 and again in 1804.

HUNT, Richard Morris, an American architect, was born at Brattleboro, Vt., Oct. 28, 1828. He went to Europe in 1843 and studied at Paris in the school of fine arts. He also made a tour through Europe, Asia Minor, and Egypt, and was employed under Lefuel in the erection of the building connecting the palaces of the Tuileries and the Louvre. Returning to America in 1855 he was engaged on the extension of the capitol at Washington. Among the buildings since designed by him are the Lenox Library, the Stuyvesant building, and the Tribune building, New York; the Yale Divinity College, New Haven; and many residences in Boston, Newport, and elsewhere.

His brother, William Morris Hunt, an American painter, was born at Brattleboro, Vt., March 31, 1824. He studied for a time at Harvard College, then went to Europe, and in 1846 began to study sculpture at Düsseldorf; soon afterwards he removed to Paris, where he studied painting under Couture. He returned to the United States in 1855, opened studios both at Boston and Newport, though he also made frequent visits to Europe. Besides many portraits he painted sketches of types of street life in Paris, and incidents of the American civil war, as The Drummer Boy, The Bugle Call. His allegorical paintings in the State capitol at Albany are the finest mural paintings in the United States. His landscapes are admirable for their truth, force, and refinement. He died Sept. 8, 1879, at Isles of Shoals, N. H.

HUNT, Thomas Sterry, an American chemist and geologist, was born at Norwich, Conn., Sept. 5, 1826. After entering on the study of medicine he devoted himself to chemistry, under the direction of Prof. B. Silliman at Yale College. In 1847 he was called to be chemist and mineralogist in the geological survey of Canada under Sir William Logan. While holding this position he was also for some years professor of chemistry in McGill College, Montreal, and in the University of Quebec. In 1872 he became professor of geology in the Massachusetts Institute of Technology. In 1855 and again in 1867 he was a member of the international jury at the Paris exhibitions, and is a member of many learned societies. He has published many important papers on theoretical chemistry, mineralogy, and dynamic geology. These have appeared in the *American Journal of Science* and the scientific journals of both Europe and America.

HUNT, William Holman, an English painter, was born at London in 1827. He studied in the school of the Royal Academy, and in 1846 exhibited his first picture, Hark. He then painted some scenes from Sir Walter Scott, Keats, and Bulwer, but in 1850 he exhibited his Converted British Family Sheltering a Christian Missionary from the Persecution of the Druids. This was the public announcement of the new school of Pre-Raphaelitism which had been formed by Hunt, Millais, and D. G. Rossetti. A strong current of thought and feeling had been directed towards study of the Middle Ages. These young painters, moved by this pervading influence, thought they had discovered in the painters preceding Raphael a closer study of nature than afterwards prevailed in art. They determined in their own work to copy nature's works with the utmost minuteness and accuracy. Hunt was the true leader and exponent of the school. Among his earlier works are Valentine Rescuing Sylvia from Proteus (1851) and Hireling Shepherd (1853). Then came in 1855 two powerful pictures, The Awakened Conscience and The Light of the World. These brought the discussion of the theory of Pre-Raphaelitism to a crisis, and Ruskin entered the lists on their behalf. Henceforth the painters were left free to follow the bent of their inclinations, the result in each case being judged on its own merits without reference to the method exemplified. Determining to paint sacred subjects Hunt went to Palestine and, as the result of a summer's study on the shores of the Dead Sea, gave to the world in 1856 The Scapegoat. He afterwards made his home at Jerusalem and only rarely visited England. His Christ Discovered in the Temple is one of the noblest results of his devotion to transcendentalism in art. It has been followed by The Flight into Egypt and The Shadow of Death, which show the same marvellous combination of intense energy of conception with minute realism in details.

HUNTER, David (1802–1886), an American general, was born at Washington, D. C., July 21, 1802. He graduated at West Point in 1822, and after being long engaged on frontier duty resigned in 1836. In 1842 he was made paymaster with rank of major, and so continued until the outbreak of the civil war. On May 14, 1861, he was made colonel of the Sixth U. S. cavalry, and on May 17 brigadier-general of volunteers. He commanded a division at Bull Run, where he was wounded. In August he became major-general of volunteers and in November succeeded Gen. Fremont in command of the Western department. On March 31, 1862, he was transferred to the department of the South, and soon after issued a general order declaring free all slaves in Georgia, Florida, and South Carolina. But on May 19 Pres. Lincoln issued a proclamation, annulling this order, and postponing for the present the decision of the question of granting freedom to slaves. An unsuccessful expedition against Charleston followed. In order to provide for the slaves who had been left on the island plantations by fugitive masters Gen. Hunter organized the First South Carolia volunteers, and Jefferson Davis thereupon issued a proclamation declaring Hunter an outlaw, who if captured should be treated as a felon. The government soon after appointed Gen. Rufus Saxton to superintend the freedmen and employ them in cultivating the abandoned lands. In September Hunter was recalled to Washington. In May, 1864, he was placed in command of the department of West Virginia, and set out on an expedition against Lynchburg. Before he reached that city a large Confederate force arrived and compelled him to retreat. He received the brevet of major-general March 13, 1865, and was retired July 31, 1866. He died at Washington, Feb. 2, 1886.

HUNTER, Robert Mercer Taliaferro, an American statesman, was born in Essex co., Va., April 21, 1809. He was educated at the University of Virginia, and having studied law at the Virginia Law-School was admitted to the bar in 1830. He was elected to the House of Delegates in 1834, and to Congress in 1837. He was chosen speaker in 1839, after a memorable struggle in which the venerable John Quincy Adams had organized the House, when the clerk refused to do his duty. Hunter was again returned to Congress in 1845, where he supported the tariff bill of 1846, and originated the warehouse system. In 1847 he entered the U. S. Senate and took a leading part in its debates, as an advocate of States' rights, until July, 1861. He strenuously resisted any interference by the general government with the institution of slavery, and maintained the right of the slaveholder to carry his slaves to any Territory. He was chairman of the finance committee from 1849 to 1861, and to prevent the exportation of silver he initiated the reduction in actual value of the subsidiary coins of the country. He opposed the homestead bill and the river and harbor bill, and framed the tariff act of 1857, which lowered the duties and reduced the revenues. In 1860 he was a prominent candidate for the presidential nomination at the Democratic National Convention in Charleston. He was active in the secession movement, and it is said that, according to the original plan of the leaders, Hunter was to be president of the Confederacy, while Jefferson Davis was to be commander-in-chief of the army. The delay in the secession of Virginia prevented this, and in July, 1861, Hunter was expelled from the U. S. Senate. He became secretary of state in the Confederate cabinet, but was afterwards superseded by J. P. Benjamin. Hunter, being elected to the Confederate Senate, became an opponent of Davis' administration. In February, 1865, Hunter, in company with A. H. Stephens and Campbell, met Pres. Lincoln and Seward in a conference at Hampton Roads, to consider the possibility of terminating the war. Pres. Lincoln absolutely refused to recognize the independence of the Confederacy, which the Southern leaders proposed as a basis of negotiation. When Gen. Lee and others asked for the arming of negroes as soldiers in the Confederate service, Hunter resisted the proposal, although when instructed by the legislature of Virginia to vote for it he did so. At the close of the war he was arrested but released on parole, and in 1867 he was pardoned by Pres. Johnson. In 1874 he was a candidate for U. S. Senator, but was not elected. In 1885 he was appointed a collector of customs.

HUNTINGTON, Daniel, an American painter, was born at New York, Oct. 14, 1816. He was educated at Hamilton College, and studied painting under Prof. S. F. B. Morse and Henry Inman. Among his early works are The Bar-Room Politician, The Toper Asleep, and some landscapes. He went to Italy in 1839, and there painted The Sibyl, Early Christian Prisoner, and other works. Returning to New York he painted portraits, and Mercy's Dream, and Christiana and her Children. Owing to inflammation of the eyes he relinquished his work, but afterwards resumed it in Italy. After returning to New York in 1846, he painted many portraits, but also historical scenes, such as Queen Mary Signing the Death warrant of Lady Jane Grey. He became a member of the National Academy in 1840, was its president from 1862 to 1869, and was again elected in 1877. He has worked in various departments of painting, and in all has shown great skill, true feeling, and rare simplicity. His Republican Court in the Time of Washington contains 64 careful portraits.

HUNTINGTON, Frederick Dan, an American bishop, was born at Hadley, Mass., May 28, 1819. He graduated at Amherst College in 1839, and studied theology in the Cambridge Divinity School. In 1842 he was ordained pastor of the South Church, Boston, being then a Unitarian. In 1855 he was chosen preacher in Harvard College, and professor of Christian morals.

His theological views underwent a gradual change, and finally, having become a Trinitarian, he entered the Episcopal Church. In 1860 he was admitted to its ministry, and in 1864 resigned his office at Harvard. He then became rector of Emmanuel Church, Boston, and in 1869 he was elected and consecrated bishop of Central New York. He was one of the founders of the *Church Monthly*, and he has published some volumes of sermons: *Human Society* (1860); *Lessons on the Parables* (1865); *Steps to Living Faith* (1873).

HUNTINGTON, Samuel (1732–1796), an American statesman, was born at Windham, Conn., July 3, 1732. He was originally a cooper, but became a lawyer in 1758, and was made king's attorney and associate judge of the superior court of Connecticut. In January, 1776, he was sent as delegate to the Continental Congress, and signed the Declaration of Independence. In September, 1779, he became president of Congress, and filled that office until 1781. He still retained his office of State judge, and in 1784 he was made chief-justice. In 1785 he was elected lieutenant-governor, and in 1786 governor of Connecticut. He retained this office until his death, which occurred at Norwich, Conn., Jan. 5, 1796.

HUNTSVILLE, a city of Alabama, the county-seat of Madison county, is in the valley of the Tennessee River, on the Memphis and Charleston Railroad, 212 miles E. S. E. of Memphis, and 100 miles S. of Nashville. It is 10 miles N. of the river, and is surrounded by the Cumberland Mountains. It has 4 hotels, 1 national bank and 1 other bank, 1 daily and 6 weekly newspapers, 11 churches, and 10 schools. The industrial works comprise a cotton-factory, ice-factory, cottonseed-oil-mill, and cotton-press. The city is lighted with gas, has finely macadamized and well-shaded streets, water-works, and a park. A spring in the centre yields 15,000,000 gallons of water daily. The city was settled in 1808 by people from the Carolinas, and was incorporated in 1818. Here the first State convention of Alabama was held, and the first meeting of the legislature. The population in 1880 was 4977, but it now exceeds 6000.

HURON, Lake, one of the Great Lakes of the St. Lawrence basin, is bounded on the N. and E. by the Province of Ontario, Canada, and on the W. by the State of Michigan. It extends from 43° to 46° 20′ N. lat., and from 79° 40′ to 84° 40′ W. long. Exclusive of its bays, the lake has a maximum breadth of 105 miles, but the average breadth is less than 75 miles. The extremest length measured as nearly as possible in a straight line falls short of 200 statute miles. The area is usually given as 21,000 sq. miles; but if Georgian Bay (its great eastern gulf) be added, the total area, exclusive of islands, will not fall below 25,000 sq. miles. It is smaller than Lake Michigan. The main body of the lake has a crescentic outline, with the convexity towards the E. On the W. or Michigan side are Saginaw Bay and Thunder Bay; while on the E. is the vast expanse of Georgian Bay, nearly enclosed by Canadian territory, being cut off from the main lake by the island of Grand Manitoulin and the Cabot's Head peninsula. The mean elevation is 589 feet above sea-level, or 49 feet less than that of Lake Superior, and 16 more than that of Lake Erie. It is stated that the average depth is over 1000 feet and the maximum about 1800 feet, making it far deeper than either of the other Great Lakes.

The boundary line between the United States and the Canadian jurisdiction takes a curved direction in such a way as to divide equally the water-surface of the main lake, without reference to the bays.

Lake Huron is remarkable among the Great Lakes for the number and size of its islands. Of these, numbering altogether 3000, nearly all are Canadian, Drummond Island and Bois Blanc being the only considerable islands belonging to the United States. Of the Canadian islands, Grand Manitoulin (80 miles long, area 1600 sq. miles) is by far the largest. The principal islands are well timbered, but very rocky, and have a surface much broken. They are chiefly disposed in a line along the N. shore, forming with its aid the safe and commodious North Channel, well sheltered from the violence of the storms which render the ordinary navigation of the lakes so hazardous. The waters of Lake Superior enter the N. N. W. end of Lake Huron through St. Mary's River, which falls 49 feet in the 75 miles of its course, but is rendered navigable by a canal and locks. Lake Michigan is on nearly a level with Lake Huron, the two lakes communicating by the Straits of Mackinaw. The outlet of Lake Huron is called St. Clair River above the expansion called Lake St. Clair; from that lake to Lake Erie it is called Detroit River.

From Michigan Lake Huron receives many small streams, including Pine, Cheboygan, Thunder Bay, Au Sable, Rifle, Saginaw, and Black Rivers, some of them navigable to a small extent. The Canadian tributaries are larger and more numerous; among them are Winnesauqua, Spanish, White-Fish, French, Maganetawan, Muskoka, Severn, Notawasaga, Saugeen, Maitland, and Aux Sables Rivers, some of them fine streams, giving exit to the waters of noble lakes.

The commerce of Lake Huron is facilitated by the very considerable number of good harbors and roadsteads, chiefly on the Canadian side. At Sand Beach, Mich., the U. S. government has constructed an artificial harbor of refuge, having a breakwater parallel to the shore, and a pier or mole at the N. end, reaching out from the land. The principal natural ports on the United Sates side are those of Hammond's Bay, Michael Bay, Presque Isle, False Presque Isle, Thunder Bay, and Saginaw Bay. Among the towns on the lake are (in Michigan) Mackinaw City, Cheboygan, Alpena, Bay City, and Port Huron. On the Canadian shore are Collingwood, Southampton, Kincardine, Port Albert, and Goderich.

The N. shore of the lake is a region of rich mineral promise; the other shores produce much grain and timber. The regions on the E. and W. are rich in salt, the Michigan side being at present more productive, but not naturally any more abundantly stocked with this commodity than the Canadian side. The fisheries of Lake Huron are considerable.

(C. W. G.)

HURST, John Fletcher, an American bishop, was born near Salem, Md., Aug. 17, 1834. He graduated at Dickinson College in 1853, taught for two years at Ashland, N. Y., and then went to Germany, where he studied theology at Halle and Heidelberg. From 1858 to 1866 he was pastor of Methodist churches in Passaic and Elizabeth, N. J. In 1866 he took charge of a Methodist missionary institute at Bremen, Germany, which was afterwards removed to Frankfort. While holding this charge he travelled extensively in Europe and the East. In 1871 he became professor of historical theology at Drew Theological Seminary, Madison, N. J., and in 1873 was made president of that institution. In 1880 he was elected bishop at the General Conference at Cincinnati. He has been a frequent contributor to the periodical press, and has published a *History of Rationalism* (1865); *Outlines of Bible History* (1873); *Martyrs of the Tract Cause* (1873); *Life and Literature in the Fatherland* (1874); *Outlines of Church History* (1876); *Bibliotheca Theologica* (1883). He has also translated and edited important works from the German.

HUSBAND and WIFE. The law of husband and wife was brought to America from England, and adopted in the several colonies with little or no modification. The wife, by the marriage, lost her capacity to make contracts or act independently, her personal property passed to the husband, her choses in action might be collected, sold, or otherwise reduced to possession by him, for his own use; her chattel interests in land he might in like manner appropriate.

See Vol. XII. p. 415 Am. ed. (p. 400 Edin. ed.).

and by the birth of issue of the marriage, which might inherit any estate of inheritance possessed by her, the husband became tenant by the curtesy in respect to such estate, and thereby was vested with a disposable life-interest. For all that the wife thus lost the law was supposed to make compensation, which consisted in an obligation on his part for the discharge of her debts, in an equity to a settlement from the property she brought him, in a right to be supported by him, and in a right to certain defined interests in his property at his death in case she survived him. The equity to a settlement from the property she brought to him was one springing originally from the necessity the husband was often under of seeking the aid of chancery to reduce to possession choses in action, or other rights or interests, in which case the court might, as a condition to its assistance, require him, if he had not made proper settlement before, to make it now to such extent as under the circumstances should appear reasonable. At length the right to have such allowance made in an original suit by her was recognized. The right to a support was to be claimed only at her husband's home unless, by his misconduct, he drove her away from it, or gave full justification for her separating herself from him. What circumstances would justify her leaving him might be open to some question: certainly great cruelty; the bringing of depraved persons to the house as associates; the refusal of proper support, and any such misbehavior as would by law entitle her to divorce or judicial separation. As to what was suitable support, however, the husband rather than the wife was to be judge, and it would only be in an extreme case that she would be held justifiable in law in leaving him. While living with him the wife had an implied agency to act in his behalf in the purchase of family necessaries, but this might be terminated by notice to dealers not to give her credit on his account. If, however, he drove her from his home by misbehavior or otherwise, she took with her the agency so far as necessary to her reasonable support, and the husband's notification to dealers would not protect him from liability for necessaries.

On the death of the husband, leaving her surviving, she was entitled to a life-interest in one-third in value of any estates of inheritance of which he may have been seized during the marriage, unless barred by accepting jointure or some provision made for her by will of the husband, or unless she had joined with him in disposing of it. From early times the joining of the wife in the husband's conveyance was held a good bar to dower. If the husband had failed to reduce to possession any of her choses in action or chattel interests in land, the right to these survived to her. Then the wife was entitled to both her own and her husband's paraphernalia, and statutes very generally made provision for further allowances from personal property, and for her support from his estate while it was in process of settlement, or at least for some definite time. About the year 1844 great changes in the legal position of the wife in respect to property began to be made by statute. The most important of these was generally embodied in a legislative declaration that the real and personal property of the wife, which belonged to her at the time of the marriage or to which she might afterwards become entitled by gift, grant, inheritance, or otherwise, should be and remain hers to the same extent as if she were a *feme sole*. The terms of some of the statutes were so broad as to cut off altogether any possible estate by the curtesy not already initiate, but others saved the right either in express terms or by judicial construction. Some of the early statutes did not give her the power to dispose of real property except with the husband's assent or by order of a competent court; but legislation soon went further, and gave her full power to make contracts of all sorts in respect to her individual property as she might if *feme sole*, including conveyances of lands. Statutes also gave her full testamentary capacity, which she might exercise independent of the husband's assent, and to his exclusion from the estate if she saw fit. Since these statutes it has not been uncommon for married women to carry on business in their own names, with full personal responsibility, and with the same power to enforce contracts that would be possessed by other persons. Meanwhile the common law dower has in some States been converted into an estate of inheritance, and in some the testamentary power of the husband has been so limited that he cannot bequeath more than a certain proportion away from his wife and family. The wife's right to property has been generally held to extend to any sum which she may recover at law for a wrong done to her in estate or person.

How far the old English law which recognized the right of the husband to govern and restrain the movements of the wife, and even to inflict moderate corporal punishment, was ever in force in America it is not easy to say. Its existence has often been assumed, but on slender grounds. The husband's battery of the wife would be a criminal offence, not to be excused by his opinion that she needed correction, though her misconduct might go in mitigation of punishment. And his attempt to restrain her movements, and to compel her, against her will, to reside where he might direct would not be aided by the law. In fine, the law has come to recognize the existence of two wills in husband and wife, neither of which can be subordinated to the other and forced into submission by legal compulsion or penalties. The old rule, however, that the services of the wife belong to the husband is generally left in force, but she employs them in his behalf only as she may choose. The wife having power to make contracts on her own behalf may make them with her husband, and may sue him upon them. In some States she may sue him at law, in others she would be compelled to sue in equity by guardian or trustee. In some States she may receive conveyances directly from her husband, but probably this rule is not universal.

At common law the right of the husband to the custody and control of children of the marriage was best, and he might, by deed or will, appoint guardians for them. The first of these rights must probably be recognized as still existing, except that, if the parties are living apart, the courts would give the custody of infant children to one or the other, according as under the circumstances should seem best for the children, irrespective of claims; and in some States there are statutes which make the mother's claim best in the very early infancy of children, or, perhaps, for female children. The father's right to appoint guardians has also been modified in some States, so as not to leave it absolute regardless of the mother's will. It will be seen from the foregoing that very little of the common law disabilities of the married woman remains, and her control of property is very generally made at least as complete as it could have been formerly by a settlement made upon her as and for her separate estate, with express power of disposition.

Simultaneously with these statutory changes in the law has been going on an agitation for concession of political rights to women, which has had some success, but, as it has not concerned married women specially, it would be out of place to consider it in detail here. The same may be said of the claim for women to participate freely in many avocations from which they were formerly excluded, and especially in the learned professions—a claim that has met with much more general favor than that for political privileges.

It is difficult to say how far the sweeping statutory changes have affected the common law of the States, but it will probably be found hereafter, as from time to time judicial decisions are made, that the changes are by no means unimportant. No doubt the great increase in divorce is to some extent attributable to the more independent position of woman, and probably agreements for separation without divorce would now be viewed with less disfavor than formerly. The old rule, that a crime committed by the wife in the presence of the husband is presumed to have been committed under duress, and therefore to be his crime, is still in force, and he is still in general left responsible for her torts. (T. M. C.)

HUTCHINSON, Anne (1591–1643), an American religious enthusiast, was born at Alford, Lincolnshire, England, in 1591. She was a daughter of Francis Marbury, a parish clergyman, and was married to Edward Hutchinson. She removed to New England in 1634 with her husband and her brother-in-law, Rev. John Wheelwright, being attracted by the preaching of Rev. John Cotton, who had come over in 1633. She was well versed in the Scriptures and in theology, and stoutly maintained that those who were in the covenant of grace were entirely freed from the covenant of works. She gave lectures twice a week, which were attended by nearly a hundred women. Her adherents, called antinomians, included Sir Henry Vane and other prominent men, and when Cotton did not approve her extreme views they tried to elect Wheelwright as his associate. But the imprudence of the latter brought on his banishment, and in May, 1637, at the annual election, Winthrop and Dudley, who had opposed Mrs. Hutchinson, were elected, though the people of Boston were favorable to her party. In August an ecclesiastical synod at Newtown condemned her views, and in November the general court brought her to trial for not discontinuing her meetings as had been ordered. She was banished after two days' trial, but was allowed to pass the winter at Roxbury. Seventy-six of her adherents were required to surrender their arms. Wheelwright had gone to Exeter, N. H., but Mrs. Hutchinson accompanied Coddington's colony, which settled on Aquidneck, now Rhode Island, in 1638, and formed a theocracy. In the next year, however, there was some trouble at the election. Edward Hutchinson was chosen magistrate, and in 1640 Coddington withdrew to Newport at the other end of the island. Afterwards the two settlements were united under one government, Coddington being chief magistrate and Hutchinson one of the assistants. Great dislike of them was still entertained at Boston, and in 1641 Hutchinson's son and son-in-law, Collins, when on a visit to that city, were arrested and imprisoned. In 1642 Hutchinson died, and Mrs. Hutchinson went to the Dutch territory of New Netherland, settling near New Rochelle. But in 1643 an Indian outbreak occurred, in which she and all her family were murdered, except one granddaughter, who was carried away captive.

HUXLEY, Thomas Henry, an eminent English naturalist, was born at Ealing, near London, May 4, 1825. His father was one of the teachers in the school at Ealing, but his education was chiefly acquired at home, where his range of studies included medicine and German scientific literature. In 1842 he engaged in the study of medicine at Charing Cross Hospital, and in 1845 received his degree from the University of London. He had already displayed remarkable powers of investigation, and had described in the *Medical Times and Gazette* a layer in the rootsheath of hair, which has since borne his name. In 1846 he entered the medical service of the navy, and after a short stay at the Haslar Hospital was sent, in the winter of that year, as assistant surgeon on the Rattlesnake with Capt. Strachey's expedition to the Southern Pacific Ocean. This expedition surveyed the east coasts of Australia and Papua, and returned to England in November, 1850, after circumnavigating the globe. The opportunity for original investigation in this voyage was embraced by the ardent young naturalist with a diligence only equalled by that of Darwin in his similar voyage. He studied particularly the invertebrate surface-life of the ocean, and sent home several communications, the first published of which was "On the Anatomy and Affinities of the Family of Medusæ." In this he called attention to the important fact that the bodies of the Medusæ consist of two cell-layers, which he compared with the germinal layers of the higher animals. The most important result of this voyage, however, was his splendid work on *Oceanic Hydrozoa* (1859), which greatly extended our knowledge of the Zoöphytes. His important papers having brought him into scientific repute, he was elected a fellow of the Royal Society in June, 1851. He resigned from the navy in 1853, and in the next year was appointed professor of natural history in the Royal School of Mines. He also received the appointment of naturalist on the Geological Survey of Great Britain. Since that period he has lived mainly in London, engaged in incessant scientific labors. To his regular lectures at the School of Mines, and his persistent investigations, he has added many popular lectures and has filled a variety of important positions. In 1855 he was appointed Fullerian Professor of Physiology to the Royal Institution, and Examiner in Physiology and Comparative Anatomy to the University of London. In 1858 he delivered the Croomian lecture to the Royal Society, taking for his subject the *Theory of the Vertebrate Skull*, a problem which he handled with great ability. After the publication of Darwin's work on *Natural Selection*, Huxley became an ardent supporter of the theory, and was the first to apply it to the problem of the evolution of the human race. In his lectures to workingmen, at the Museum of Practical Geology, in 1860, he dealt with *The Relations of Man to the Lower Animals.* These lectures gave rise to warm controversies in the British Association in that and subsequent years. The whole matter was summed up in his *Evidence of Man's Place in Nature* (1863), in which he endeavored to trace the ancestry of man to the anthropoid apes. This work attracted strong interest and gave rise to much discussion. He continued to lecture to the workingmen on Darwin's views in 1862, and published his lectures under the title *On our Knowledge of the Causes of the Phenomena of Organic Nature.* He delivered lecture courses also on the *Elements of Comparative Anatomy*, the *Classification of Animals*, etc. From 1863 to 1869 he was Hunterian professor in the Royal College of Surgeons, was made president of the Geological Survey in 1869, and in 1870 was president of the British Association for the Advancement of Science in its meeting at Liverpool. After the education act of 1870 went into force Prof. Huxley served on the London school board for two years, and was chairman of the committee which drew up the scheme of education adopted in the board schools. He took an active part in the discussion of educational systems, and was conspicuous for his opposition to denominational teaching and for his vigorous denunciation of the doctrines of the Roman Catholic Church. He was elected lord rector of Aberdeen University for three years in December, 1872, and installed Feb. 27, 1874. In 1873 he was elected secretary of the Royal Society, and in the summers of 1875 and 1876 was acting professor of natural science at the University of Edinburgh during Prof. Thomson's absence with the Challenger expedition. In June, 1879, he was elected corresponding member of the French Academy of Science in the sections of anatomy and zoölogy, in the place of the Russian naturalist Baer. In 1881 he was made inspector of fisheries, to succeed Frank Buckland, deceased, and in July, 1883, he was chosen president of the Royal Society. In the same year he was elected a foreign member of the American National Academy, and delivered the Rede lecture at Cambridge on *The Origin of the Existing Forms of Life—Construction or Evolution.* In 1876 he visited the United States, where he delivered a series of popular lectures since published.

Prof. Huxley ranks to-day as the first zoölogist among his countrymen and has a world-wide reputation, unsurpassed by that of any other living scientist. This reputation is due to the breadth of the field which his researches have covered—the word zoölogy with him embracing the whole range of animal biology—his extensive knowledge, his clear, incisive, and brilliant style of writing, his quick perception of scientific principles, and in particular to his outspoken advocacy of certain radical and startling doctrines, which have brought his name into notice in all ranks of society. One of these doctrines, already mentioned, is that in which he advocated the descent of man from the apes. Another was his theory of the *Physical Basis of Life*, which formed one of his *Lay Sermons* (1870). In this he combats the prevailing idea that life is a principle distinct from organization, and holds that it is but the outcome of the qualities of protoplasm, a substance found in every part of every organism, and which he considers to be the physical basis of life. This doctrine, advanced in his trenchant style and with his felicity of illustration and vigor of argument, attracted very wide-spread attention at the time. It was followed by a yet more startling doctrine, advocated before the British Association at Belfast in 1874, and based on the phenomena of certain cases of brain injury, to the effect that the seeming voluntary movements of animals, and even those of man, are really automatic and independent of will, and to some extent of consciousness. It embraced the definite declaration that an animal is a machine, a sort of highly complex clock, wound up to run for a certain period, and that such consciousness as exists is but a side-product of its activities and has no actual controlling influence over these activities.

Apart from these side-issues of a vividly active mind, and from a strong tendency to generalization, Prof. Huxley is one of the most exact and indefatigable of scientists, and has pursued his studies with an intensity injurious to his health. His researches have covered the various fields of comparative anatomy, morphology, physiology, embryology, palæontology, etc., and in addition to much exact knowledge have led to many valuable generalizations in the affinities and classification of animals. He was the first to remove the echinoderms from the radiates, and to prove their affinity to the vermes; he has made important advances in our knowledge of the morphology of the mollusca and arthropoda, and has offered many valuable suggestions in classification. His *Manual of the Anatomy of Vertebrated Animals* (1871) favorably compares with the splendid works of Gegenbaur on this subject, while its brilliant handling of the problems of comparative anatomy was completed in 1877 by his *Anatomy of Invertebrate Animals.* In his dealing with the vertebrates he has been as suggestive and happy as in his handling of the lower orders of life, and has displayed a marked power of scientific foresight in his almost prophetic conceptions of the character of the early birds and of the progenitors of the horse, conceptions which have been strikingly verified in the discovery of toothed birds by Prof. Marsh, and of the tertiary ancestors of the horse. Of his services in classification may be mentioned his discovery of the close affinities of birds and reptiles, his grouping of them in one class under the name Sauropsida, and his like combination of batrachians and fishes into the single class Ichthyopsida. He has, in fact, an unusually broad and clear discernment of the laws and affinities of organic nature, and can be credited with the high honor of scarcely ever making a mistake in a scientific deduction, despite the voluminous character of his work. Prof. Huxley has by no means confined his attention strictly to biological science. He strays to the fields of physical geography in his *Physiography, an Introduction to the Study of Nature* (1877), while he keeps himself well acquainted with the poetry, fiction, and other literary work of the day. One example of his interest in general topics we possess in his biography of *Hume* (1879), in which are displayed all that vigorous command of language and literary richness of style which have done so much to give popularity to his works on abstruse scientific subjects. Other illustrations of the same ability may be found in his *Lay Sermons*, his *Critiques and Addresses*, his *Lectures to Workingmen*, etc. As a public speaker he is quiet, deliberate, fluent, almost colloquial in manner. By his numerous lectures and his many popular works he has done much towards spreading the modern conceptions of biological science among the general public. And he has accomplished the difficult task of rendering intelligible to educated people generally some of the most difficult of scientific problems. He has been elected a corresponding member of numerous scientific societies, has received the Wollaston medal of the Geological Society, the honorary title of LL. D. from the Universities of Edinburgh, Dublin, and Cambridge, and other marks of high appreciation both from foreign and home sources. Recently his health has been so affected by his arduous labors that he has been obliged to resign the several positions which he held, those of naturalist of the Geological Survey, inspector of Fisheries, president of the Royal Society, and professor of the Royal School of Mines. In the latter institution, with which he has been so long connected, he still retains an honorary position. In consequence of these resignations a pension has been granted to him by the government based on the general plea of his services to literature.

In addition to the works already named Prof. Huxley is the author of *Lessons in Elementary Physiology* (1866); *An Introduction to the Classification of Animals* (1869); *The Crayfish, an Introduction to the study of Zoölogy* (1879); *Science Culture and other Essays* (1882); together with numerous valuable papers published in the *Transactions* and *Journal* of the Royal, Linnæan, Geological, and Zoölogical Societies, the *Memoirs of the Geological Survey of Great Britain*, and in several popular periodicals. In his controversial reply to Mr. Gladstone (1886) on the subject of the creation of animals, as given in Genesis, his ability as a literary combatant is strikingly manifested.

(C. M.)

See Vol. XII. p. 435 Am. ed. (p. 419 Edin. ed.).

HYACINTH, the name of a favorite cultivated species of liliaceous plants of the genus *Hyacinthus.* They possess bulbous roots, bell-shaped flowers, with a 6-cleft perianth, and dry capsular fruit. *H. orientalis*, the cultivated species, is a native of Persia, Asia Minor, and Syria, and is naturalized in some parts of Southern Europe. It has a whorl of broad linear leaves, rising from the bulb, and a flower-stem with many flowers arranged linearly or in a raceme. The hyacinth occurs abundantly in its native locality in form not unlike the common harebell. It has long been cultivated, with a remarkable change in its conditions, the cultivated form being one of the most beautiful and fragrant of our garden-flowers. This cultivation has been principally conducted in Holland, which has become a centre of export for hyacinth bulbs and where more than 2000 varieties have been named. They are grown there in such profusion as to give a gorgeous aspect to some of the Dutch towns. In the wild state the hyacinth flower is blue and single. As cultivated, both single and double varieties are common, while many shades of color are produced, principally red, white, and blue. The yellow varieties seem a greater deviation from the original and their bulbs are delicate.

An immense number of bulbs are annually imported into this country from Holland and are thrown by or allowed to depreciate by neglect after once blooming. Great care is needed for their proper cultivation. They should be planted in a rich, light, sandy soil, the beds being covered with decayed tan-bark or the like material and protected by mats in severe weather. The time of blooming is early spring, the hyacinth flowers immediately following those of the crocus. To preserve the bulbs the flower-stem is broken when the flowering is over, but the leaves are left till they turn yellow. Then the bulb is taken from the ground in May or June and carefully dried in the shade. There are few flowers better adapted to house-culture than the hyacinth. For this purpose the bulb is potted in the autumn, and may be brought into bloom as early as Christmas if potted early and forced. By potting from September to November a continuous winter bloom may be assured. The hyacinth will grow well in wet sand, and even in water. The bulb should be kept a week or two in damp sand or moss before being placed in the water. After the roots are an inch or two long it is placed in a vase-shaped glass, preferably dark-colored and opaque, filled with rain-water, with a lump of charcoal, and kept in the dark for a few days before exposure to sunlight. November is the proper month for this. (C. M.)

See Vol. XII. p. 578 Am. ed. (p. 545 Edin. ed.).

HYDROPHOBIA. This word, signifying "dread of water," from its most marked symptom is the name given to a specific disease. "Rabies" is frequently used as a synonym. It is produced by a specific poison or virus. The virus exists in the salivary glands and the central nervous system of the dog, horse, wolf, fox, pig, cat, and a number of other lower animals. It can be communicated from one animal to another, and from any of these animals to man. Up to the present time no evidence exists that it has ever been communicated from one human being to another. How the disease originates, whether spontaneously or only by inoculation from one animal to another, has not yet been settled. The more reasonable view seems to be that it originates only by inoculation.

The principal seat of the poison is unquestionably in the saliva or spittle of animals. The curious experiments of Dr. Sternberg, of the U. S. Navy, have shown that even normal human saliva is not without danger, if not actually poisonous, and have given a new interest to the study of the effects of the saliva of animals. But they are so recent that they have not yet been sufficiently studied to warrant a definite opinion on the subject. The researches of M. Pasteur and others have apparently shown that while the virus resides in the saliva, it is even more intense in the central nervous system, that is the brain and spinal cord. While its existence in the saliva is a constant menace to man, yet it has its advantages, since when an animal bites a human being it is frequently apt to be at a point that is covered by the clothing, and so the teeth are wiped clean in penetrating the clothes, the bite being thus often rendered harmless.

As it is all important to be able to recognize the symptoms of rabies in suspected dogs, the following is a summary description, chiefly from Virchow, whose portrayal is perhaps the most vivid. It exists in three stages, the melancholic, the furious, and the paralytic. The first is often unnoticed at its onset. There is restlessness and change of place, sudden waking from sleep, irritability and loss of appetite. The specific symptoms soon develop. There is great sensitiveness in the scar if one exists; the dog laps his own urine and eats the fæces of other dogs, with a peculiar appetite for unnatural articles of diet, such as straw, paper, wood, etc.; much sexual excitement exists; he seems friendly to the cat, but exhibits a marked change in his usual affection for his master, becomes shy and backward, and avoids observation. The organs of swallowing and breathing soon become involved as if something were sticking in his throat, the voice is altered, the saliva is arrested; he licks cold surfaces, such as stone, iron, etc., and there is marked debility.

The furious stage generally sets in from 1 to 3 days, and is rarely delayed after the eighth day. The dog is restless and irritable, runs out of the house, attempts to bite, not by systematic and vicious attacks, but aimlessly, goes from place to place without thought or reason, endeavors to break his chain or destroy his kennel, his inability to do so increasing his rage, and if he gets loose he will run great distances. Then follows sometimes a period of remission, which is deceptive and against which we should be on our guard.

After the acute mania of this stage and its dangerous snappishness, there follows the third stage of paralysis. The paroxysms become weaker and remittent, the coat falls off, the flanks sink in, the legs are weak and lame, he lies on one side in great prostration, but when roused still snaps and bites. If able to walk, he totters and drags himself about, the eyes are sunken and dull, the mouth open and dry, the tongue hanging out and hard, the heart weak, irregular, and intermittent, the breathing oppressed, and convulsions may occur. Death takes place from exhaustion or during a paroxysm in from 5 to 8 days from the beginning of the attack.

When a person has been bitten by a supposed rabid dog the most senseless thing to do is nearly always done, viz.—to kill the dog. The proper thing to do is to determine the fact whether the dog is really mad, and this can only be done by preserving it under observation for a definite time. If the dog is proved to be not mad the fear that must always exist that the bitten person will suffer from hydrophobia will be seen to be without any foundation, and if the dog is really mad the precautions to be named later should be taken at once. Pasteur's very sensible advice is as follows: "Every mad dog, whether it eats or not, dies from rabies in a few days. If it eats, death takes place more slowly, but this time never exceeds 8 or 10 days. In the interval it exhibits rabid symptoms. Confine the dog to his kennel, where he must be fed with precaution for at least 12 days. This had better be done under the supervision of a veterinary surgeon. If the dog lives after the time indicated you may be assured that it is not mad."

After a person has been bitten by a dog that is really mad there is a period of "incubation" or development during which the victim shows no symptoms of the disease. This period, in 89 cases analyzed by Blatchford and Spoor, of Troy, was on the average 70 days, a period fortunately sufficiently long for prevention, if such means, as now seems probable, really exist. In 23 cases it was 30 days and under, and the maximum in 6 was 200 days. There seems to be, however, little doubt that this period may be much longer. It may extend to 18 months or even 3½ years. Those cases in which many years have elapsed, as is alleged, between the bite and the development of the disease, in most cases are unreliable.

No age, sex, country, climate, or season seems to be exempt from the disorder. Europe has, however, furnished the greatest number of cases. It is more common in Canada and New England than in the South in this country. The general opinion that it is a disease of summer is erroneous. Of 2550 cases noted, 1704 occurred in the spring, 621 in summer, 608 in the autumn, and 587 in the winter. Of all persons bitten only about one in six develop the disease.

The wound inflicted by a rabid dog generally heals as kindly as any other. When the disease is about to break out the scar begins to itch, burn, and smart. It becomes sore and irritable, the pain radiating to some distance. The wound reopens and the absorbent vessels leading from it towards the trunk become reddish lines. Soon a general feeling of discomfort is experienced, with headache, disturbed sleep, a melancholy feeling, and more or less chilliness. In from 12 to 24 hours any attempt to swallow is accompanied by a spasm of the throat so severe that the patient dashes away the cup, and though tormented with thirst will touch no liquid, or if he does so he is oppressed by a sense of impending suffocation and jumps from the bed or couch panting for breath. There is severe pain located in the throat, with a sense of constriction of the chest, difficulty of breathing, sighing respiration, and the thickened ropy saliva and mucus accumulate and aggravate the already existing thirst which he cannot relieve by drinking. His fruitless attempts to swallow end only in renewed spasm and fright. Meanwhile he becomes sensitive in a high degree to the slightest movement, the faintest noise, and the lightest breath of air. All these provoke the most fearful spasms not unlike those of lock-jaw. His irritability increases till it amounts to a veritable and often violent delirium. The last stage is the most deplorable. His eyes are glaring, the pupils are dilated, his tongue is dry and parched, his voice shrill, his appearance haggard and horror-struck, the breathing is panting, the pulse 140 to 160 and feeble, and he is exhausted to the last degree. After 2 or 3 days from the onset of the malady he dies, exhausted by the paroxysms, either suddenly by suffocation or in a final calm produced by the weakness. No cases of recovery, that are reliable from a scientific point of view, have been reported.

Post-mortem examinations have shed but little light on the essential nature of the malady. Forster asserts that there is congestion of the spinal cord with many points at which the blood has escaped in small amounts. Congestion of the throat has also been observed. That it is an intense nervous malady is not to be doubted. It is not probably propagated through the blood itself, as is shown by the long period of latency, nor by the absorbent vessels, else the absorbent glands would be involved.

The treatment is not an easy matter to determine. Youatt, from an experience in some 400 cases and four times upon himself, states his belief that cauterization with nitrate of silver ("lunar caustic") is a specific. This is strong evidence, yet it would seem that cutting out the part, if that be practicable, and cupping, if the means are at hand at the moment, should precede the caustic. Even at a comparatively late period excision of the part is not to be neglected, as it not only *may* prevent the action of the poison, but does very much to relieve the patient's mind of the fearful dread of the malady, which is a large element of the mental torture during the disease and possibly of its production. If the disease has been actually developed, of course it will do no good. Other treatment will unhappily do little or nothing to cure, but something may be done which will relieve the patient's sufferings. Inhalations of the nitrite of amyl, ether, or chloroform, with sufficient doses of morphia hypodermatically, will give some relief. The nitrite of amyl seems to hold out the best promise of relief, especially as to the inability to swallow liquids. The room should be kept dark and warm, and the utmost quiet should prevail. A fearless and judicious doctor and an efficient nurse are among the best means of assuaging the terrors and sufferings of the victim of this dread disease.

M. Louis Pasteur, of Paris, who has done so much by his researches on fermentation, pébrine or silkworm disease, splenic fever, and chicken cholera, etc., has of late turned his attention to hydrophobia. Should his claims prove true we shall owe him a debt not easily appreciated, and one that can never be adequately discharged. Sufficient time has not yet elapsed, and a sufficient number of experiments on the lower animals has not yet been made, nor has a sufficient trial been made in man to allow a positive opinion to be expressed on the validity of his claims. But it is certainly true also, that both his past reputation for scientific accuracy and acumen, and the results so far obtained, present a strong evidence of the probable truth of his present assertions.

Pasteur states that by passing the virus through a number of monkeys successively it loses its virulence, but that by passing it through a number of rabbits in succession it gains greatly in power. This transmission is effected by inoculating one animal from a rabid dog, the second animal from the first, the third from the second, and so on—the inoculations being made chiefly by trephining the skull, a much more certain plan than by inoculations under the skin. He also asserts (and this is his most recent method) that if he inoculates a number of rabbits from one to another in a series, and then exposes the spinal cords of these rabbits in glass jars, entirely free from moisture (by caustic potash), and at a constant temperature of 20° (centigrade), they lose in virulence with each day of such exposure until, after a period of fourteen days after death, no poisonous effect results from their inoculation into a healthy rabbit or dog. The result of numerous experiments has been that a spinal cord so kept has, as a rule, a certainty of action dependent entirely upon the time of such exposure. That is, while the cord of a dog that has died of rabies, if inoculated when fresh, will produce rabies in a rabbit in 14 days; that of a rabbit dead of rabies is more virulent, and will cause rabies in 7 days if inoculated when fresh. But if this rabbit-cord be kept as above described, it will produce by inoculation milder and milder symptoms, in proportion to the length of time it has been kept, till at last, when it has been kept for 14 days, it will produce no symptoms whatever.

Next he inoculated these modified cords on healthy rabbits, beginning with the weakest, and he found that daily inoculation of the same rabbit with more and more virulent cords produced no ill effects, immunity apparently being produced by the preceding inoculations. At the end of the series, inoculations even of perfectly fresh cords that should produce the disease in 7 days were followed by no ill results whatever, if preceded by such graduated inoculations. He communicated his results to the French Academy of Sciences, and a commission was appointed to examine the results. Pasteur furnished them with 23 protected dogs, and these dogs with 19 others unprotected, were all vaccinated with the fresh virus. Of the 19 unprotected, 14 died of rabies; of the 23 protected, 1 died of diarrhœa, and all the others escaped.

Feeling now sure of his ground, Pasteur was ready to try it on human beings, and did not hesitate on July 7, 1885, when a boy recently bitten presented himself at his laboratory, to inoculate him. This historic boy—Joseph Meister—was subjected to 12 inoculations, beginning on the seventh and ending on the 16th. Each inoculation was tested or "controlled" by making at the same time an inoculation from the same cord upon a healthy rabbit. Those from a number of the fresher cords produced rabies in the rabbits, but none of them had any effect upon the boy, so that at the end of the inoculations he was considered by Pasteur not only proof against canine rabies but against rabbit rabies, which he considers much more virulent. So far, no account of any deleterious effects of the vaccinations or of any outbreak of the disease in the boy has been reported (April, 1886).

A number of other inoculations upon human beings have been practised by Pasteur since then, some upon persons from America. The number amounts to 350 (Comptes Rendus, March 1, 1886, in *The Medical News*, April 24, 1886) and in only one case has rabies followed. In this case the inoculations were not commenced till 36 days after the patient was bitten. Of a number of wolf-bitten Russians since treated, however, several have died of rabies, but the wolf virus is said to be much more virulent than that of the dog, and their cases may therefore be exceptional. It is now proposed that a large hospital shall be established in Paris, to be under Pasteur's care, where patients bitten shall be treated.

It must not be ignored that some medical men of such attainments as to challenge our respect, assert that there is no such disorder whatever. In view of all the facts, however, this hardly seems a tenable position. The general consensus of the medical profession, not only of men who have given no critical study to the alleged disease but of those of the greatest eminence, is too strongly in favor of the real existence of hydrophobia to believe that they have been deceived. (W. W. K.)

See Vol. XII. p. 612 Am. ed. (p. 577 Edin. ed.)

HYMNS. The use of hymns other than versifications of Scripture began somewhat later in this country than in England. Until near the close of the last century versions of the Psalms held the field. The so-called "Bay Psalm Book" went through many editions from 1640 to 1762, and was much used in New England; the revision of it by T. Prince, 1758, met with little favor. About 1750 the English *New Version* of Tate and Brady, with a small supplement of hymns from Watts, began to be used in and near Boston. In other parts Watts, Tate and Brady, with perhaps here and there the Scotch version and that of Sternhold and Hopkins, must have supplied the wants of our ancestors during colonial times. After the Revolution imported editions and reprints were less relied on, and home-made books multiplied. Under the auspices of the Association of Connecticut, Joel Barlow in 1785, and Timothy Dwight in 1800, severally completed and revised Watts' version of the Psalms, adapting it to American use, and adding each a selection of hymns. Their books were much used during the first years of the present century (Barlow's in and about Philadelphia especially), and some of Dwight's paraphrases, or rather hymns based on parts of psalms, are still valued and familiar.

Our first important hymn-writer was Samuel Davies (1723–61), president of what is now Princeton College. His MSS. were intrusted to Dr. Gibbons, who published therefrom in London five volumes of sermons, and 16 hymns in his book of 1769; some of these are still in use. So are a fragment from Mather Byles (1706–88); one or two pieces ascribed by unconfirmed tradition to Samson Occom, the Indian preacher (1723–92), and one by Benjamin Cleveland, before 1792. Henry Alline (1748–84), the founder of a peculiar sect, left 486 hymns (3d ed., 1797), some of which were considerably used for a while.

Toward the end of the last century, and later, appeared in New England and elsewhere sundry collections which reflected the revivalistic spirit of the time, and contained much new material. Rude, often illiterate, but ardent, and not without flashes of real poetry, these effusions were mainly anonymous, but some of them came from John A. Granade and Caleb J. Taylor, Methodists, and John Leland (1754–1841), a well-known Baptist. Among the most important of these curious works were the so-called "Baltimore Collection," ab. 1800; that of Joshua Smith, 9th ed., 1799, and that of Elias Smith and Abner Jones, 1805–10. This last was the earliest compilation for the sect called Christians, and is of no little interest and value. They are all scarce now, and it is probable that several books of this class and era either have perished or are so rare as to be unknown to students.

From this point onward the progress of American hymnody, both in writing and in compiling, may best be traced on denominational lines. With no desire to emphasize these, the subject cannot be presented accurately or clearly if they are ignored.

The Episcopal Church adopted in 1789 Tate and Brady entire, with 27 hymns, to which 30 were added in 1808. In 1827 appeared the 212 hymns long bound up with the Prayer Book, including important originals by H. U. Onderdonk, W. A. Muhlenberg, and F. S. Key, and earlier lyrics from G. W. Doane and J. W. Eastburn; a number of these were very widely copied. The book was influenced by Muhlenberg's *Church Poetry* (1823). In 1833 an abridged Version of Psalms, with a few from other quarters, superseded Tate entire. This provision lasted, with some license in the sixties, till 1871, when the present Hymnal appeared: it received slight revision in 1874. The chief Episcopal writers of later years are Bishop Coxe, Bishop Burgess, and Dr. Crosswell.

The Lutherans put forth English hymn books in 1795, 1797, and 1806, all in New York. Their *New York Collection* (so called), 1814–34, was long and widely used. The General Synod issued a collection in 1828, revised, 1841 and 1850, and another, 1871: the General Council in 1865, revised, 1868. The Tennessee and Ohio Synods have put forth several books, the last of which from Ohio, 1880, contains numerous originals and translations from the German, by M. Loy, E. Cronenwett, C. H. L. Schuette, and others. The German Reformed body has issued no very notable collections, but has had in Drs. H. Harbaugh and E. H. Nevin two writers of repute.

The Methodists began with a *Pocket Hymn Book*, whose origin was long a mystery: Rev. C. S. Nutter has lately proved it to be a reprint of that of T. Spence, strangely enough the very book that John Wesley preached against. From this grew by degrees the collections of 1836 and 1849, whose contents were mainly from C. Wesley. In 1878 came the present Hymnal. There are also various collections for semi-private use, and of other societies, as the Southern Methodist Episcopal of 1847, and several of the Methodist Protestants and Wesleyan Methodists. Leading names are those of Drs. W. Hunter, T. O. Summers, and T. H. Stockton.

The Universalists began early, issuing two books (Philadelphia and Boston) in 1792, and were for a while very active. One of their first workers was George Richards (*c.* 1755–1816), one or two of whose 75 hymns survive, and are among the few of theirs which have travelled beyond the denomination. In 1808–10 appeared 415, "composed at the request of the General Convention," by Hosea Ballou, Abner Kneeland, S. Streeter, etc. Later, books were compiled by S. and R. Streeter (1829); H. Ballou, 2d (1837); A. C. Thomas (1839); Adams and Chapin (1846); J. G. Adams (1861); H. C. Leonard (1865). All these contain originals, by the editors and others.

Both in writing and in compiling, the Unitarians have done a work which for quantity and quality alike is proportioned to their advantages of education and position rather than to their numbers. Dr. Putnam's *Singers and Songs of the Liberal Faith* (1874) bears witness to the extent of this field without exhausting it, and is a monograph such as no other religious body in America as yet possesses. Their earliest books (in substance, though perhaps not in name) were issued in Boston, by Jeremy Belknap (1795); James Freeman (1799); and the West Society (1803). Notable later collections were prepared in Philadelphia (1812); by H. D. Sewall ,in New York (1820), Bryant and the Gilmans contributing; by W. B. O. Peabody in Springfield (1835); by F. W. P. Greenwood (1830), enlarged by R. C. Waterston (1835); by W. P. Lunt (1841); by J. Freeman Clarke (1844–55); by G. W. Briggs, G. E. Ellis, and the Connecticut Cheshire Association, severally, in 1845; by Chandler Robbins, in 1843–54; by S. Longfellow and S. Johnson, 1846–48 and 1864; by C. A. Bartol (1849;) by Drs. Hedge and Huntingdon (1853); by Dr. S. Osgood (1862); and L. J. Livermore, *Hymn and Tune Book* (1868). Among the writers for these are many distinguished names: Andrews Norton, Henry Ware, Jr., Dr. S. Gilman and his wife, Mrs. Follen, John Pierpont, John Quincy Adams, Drs. Furness, Peabody, Frothingham, and Hedge, Mrs. Miles, Theodore Parker, Bryant, Emerson, the Longfellows, Samuel Johnson, E. H. Sears, J. F. Clarke, W. H. Burleigh, C. T. Brooks, S. G. Bulfinch, Jones Very, T. W. Higginson. Many of their hymns are favorites in other bodies, and some of them are widely used in England as well as here.

The Baptists have produced a greater number of books than any other home denomination, though most of these are small in size and revivalistic in character. They have also many writers, but only one of marked importance. Among the former may be mentioned the Boston Collection (1808); Parkinson's (1809–17); Maclay's (1816); Winchell's *Supplement to Watts* (1819–32); several by A. Broaddus (1828–42); Mercer's *Cluster* (1835); Linsley and Davis' *Select*

Hymns (1836–41); *The Psalmist* (1843); Banvard's *Christian Melodist* (1849); Manly's Southern *Baptist Psalmody* (1850); *Baptist Harp* (1849); *Devotional Hymn Book* (1864); Baptist *Hymn Book*, *Praise Book*, and *Service of Song* (1871). The most valuable and widely circulated of these, *The Psalmist* (1843), includes numerous originals by S. F. Smith, one of the compilers, and a few by S. S. Cutting, H. S. Washburn, G. Robins, and others. Among earlier writers are Dr. T. Baldwin, J. Leland, O. Holden, Mrs. Sigourney, and the Judsons. Dr. Smith, both for number and quality, stands at the head. Besides their own compilations, there have been Baptist editions of the leading Congregational books for the last 55 years. Several minor Baptist sects have their own collections.

The first important and meritorious Congregational book—apart from Psalm versions by Barlow—was *The Hartford Selection* (1799) by N. Strong and others, with some originals. Then came Worcester's *Watts' and Select Hymns* (1815–34); this had a great circulation. So had Nettleton's *Village Hymns* (1824), which derived part of its missionary spirit from a little volume, *Hymns for the Monthly Concert* (1823), prepared by L. Bacon while a student at Andover, and now very rare. In these two first appeared the hymns of W. B. Tappan, Mrs. Sigourney, Mrs. A. B. Hyde, and Mrs. P. H. Brown. Mason and Greene's *Church Psalmody* (1831) was long and widely used. The Connecticut Association's *Psalms and Hymns* (1845) contained some originals by Drs. Bacon and Fitch, two of the compilers. Henry Ward Beecher's *Plymouth Collection* (1855) and the Andover *Sabbath Hymn Book* (1858) marked an advance in range of materials and standards of taste. L. W. Bacon has issued *The Book of Worship* (1866) and *The Church Book* (1883). The Oberlin *Manual of Praise* (1880) was prepared by Profs. Mead and Rice. E. Nason's *Congregational Hymn Book* (1857) took more pains than was usual at that day to give authors' names correctly.

The Presbyterians appear to have been content for some time with Watts. In 1828–29, at Princeton, appeared their first *Psalms and Hymns*, which, revised in 1830 and 1834, culminated in the volume of 1843, long used by the Old School branch. More variety was found in Joshua Leavitt's *Christian Lyre* (1830–31), containing originals by J. B. Waterbury, W. Mitchell, J. Hopkins, D. Dutton, and others; and in T. Hastings' *Spiritual Songs* (1831–33), with many of his own lyrics, and several by S. F. Smith and R. Palmer; the three leading American writers thus making what seems their first appearance in the same book. These two had music, then a novelty in a hymn book proper. Dr. Hastings, by far the most voluminous of our singers, continued his work in *The Christian Psalmist* (1836), and with his son in *Church Melodies* (1858), besides contributing to other collections. Dr. Beman's *Sacred Lyrics* (1832) gave its name to his much larger book of 1841, which, as the *Church Psalmist*, was adopted by the New School Assembly in 1843. The same year appeared in Philadelphia *Parish Hymns*, enlarged, 1844, as *Parish Psalmody*, both containing originals by Mrs. J. L. Gray and others. Abner Jones' *Melodies of the Church* (1832), and his son's *Temple Melodies* (1851), and *Songs for the New Life* (1869), had some success. The *Hymnal of the Presbyterian Church*, and a similar Southern book, both 1867, were on the old lines; more modern in spirit and scope is *The Presbyterian Hymnal* (1874). *The Sacrifice of Praise* appeared 1869. The most active and popular of recent compilers is Dr. C. S. Robinson, whose compilations, *Songs of the Sanctuary*, etc., range from 1862 to 1884; the most careful and studious are Dr. Hatfield (1872), Drs. Hitchcock, Schaff, and Eddy (1874), and Messrs. Lasar and Hall (1880). Dr. C. H. Richards, of Wisconsin, has produced two noteworthy books (1880–83).

The lines between Presbyterian and Congregational have not been strictly drawn; the same books are often used by societies of both kinds, and bear no certain mark of affiliation. The same is true, in later years and less degree, of the (Dutch) Reformed. They had their own version of Psalms before the Revolution, and editions of *Psalms and Hymns* dated 1789, 1814, 1831, and 1849. *Hymns of the Church* (1869) is a great improvement on its predecessors. To this body belong Dr. Bethune and Dr. A. R. Thompson.

The very popular *Gospel Hymns*, and many of similar character, fall under no denominational head; they gave currency to the verses of P. P. Bliss, Fanny Crosby (Mrs. Van Alstyne), and many others. The increasing flood of juvenile hymns likewise transcends bounds and defies description. Mrs. G. C. Smith's *Woman in Sacred Song* (1886) contains immense missionary and temperance departments, and brings out hundreds of writers hitherto little known.

No extended account of American hymns and writers as yet exists in permanent form, though the subject has been handled in the columns of the *New York Independent* (1880–84), and in those of the forthcoming *Dictionary of Hymnology*, to be published in London. Prof. Cleveland's *Lyra Sacra Americana* (1868), a volume of selections, by no means covers the whole ground, and is more valued in England than here. Of selections from all sources, intended for home reading, among the most important are Dr. Schaff's *Christ in Song* (1868) and *Library of Religious Poetry* (1880).

In translating, we have done no work to compete with that of Neale, Caswall, and Chandler, of J. Wesley and Miss Winkworth. Dr. H. Mills' *Horæ Germanicæ* (1845–56) is valuable rather for good intention than successful execution. Dr. N. L. Frothingham also has rendered many German hymns. Bishop Doane in 1824 anticipated the era of popular versions from the Latin, and Bishop J. Williams, in *Ancient Hymns of Holy Church* (1845), made a larger attempt. A few valued hymns from foreign sources have been made by Drs. J. W. Alexander, Bethune, Hedge, Palmer, and Prof. R. P. Dunn; and M. W. Stryker and S. W. Duffield are working at this vein.

All our collections for public worship, of course, are filled mainly with hymns of British origin, though those born on American soil occupy increasing space in books of the last thirty years. Here, as elsewhere, we command the vast literature of the mother-land; and we have as yet no Watts, Wesley, Montgomery, Bonar, or Neale of our own. But Ray Palmer is in the rank next to these, and particular pieces by a few who have written less stand with the best. "I Love Thy Kingdom, Lord," "I Love to Steal Awhile Away," "Thou Art the Way," "My Faith Looks Up to Thee," and "O Sacred Head, Now Wounded," are known everywhere. The youngest of these is 55 years old; a hymn must have time to find its place and fame. The loveliness of Dr. Sears' two Christmas songs is widely recognized, and a missionary hymn of Bishop Coxe, though not much known here, is among the sweetest in *Hymns Ancient and Modern*.

Advancing standards of taste have made a marked improvement in our hymnals; and though less attention has been paid to hymnology here than in England, some of our recent hymnals are as carefully edited, as accurate in matters of text, authorship, and date, as any. The pioneer worker in this department was David Creamer, of Baltimore (1848); his work has been followed up by Rev. C. S. Nutter for the *Methodist Hymnal*, and by Dr. Putnam for the Unitarians. Whether we do our share in producing original material or not, there is little question that the art of compilation will continue to be cultivated with diligence, and loving care be bestowed on the service of song in the Lord's house. (F. M. B.)

HYPOTHECATION (from Greek *Hypotheca*, a pledge) is the right to satisfy a debt that is due and unpaid by a sale of the property pledged for it, and, strictly speaking, it differs from the pawn or pledge in that possession of the security is not given to the creditor; but this form only survives in the mechanic's lien or a seaman's claim for wages; for the term hypothecation is currently applied to many forms of pledge, and may be defined, according to Domat, as an appropriation of the thing given for the security of the engagement. However, there is distinction in the names used to describe the pledging of various property: thus, the pledge of tools, furniture, utensils, or apparel, is called a pawn; the pledge of real property, such as lands and buildings, is called a mortgage; and, generally speaking, hypothecation is the pledge of negotiable instruments, bonds, certificates of stock, and evidences of value or property in which the title is complete. To make the title complete when there cannot be strict possession of the property, there are certain convenient forms: thus, in the case of goods on shipboard, or otherwise in transit, the transfer to the pledgee of the bills of lading makes title to the property. So of merchandise on storage or in bond, does the warehouseman's receipt form the usual understanding of possession. With these transfers to the pledge also goes the written obligation of the debtor pledging the property, and describing the conditions and agreements of the pledge, which may be for a fixed time or for an indefinite period, in which latter case the debt is to be paid and the possession delivered back upon the call of either pledgeor or pledgee; this call provides such notice as may be agreed upon. Thus pledges or loans are currently spoken of as being in 1, 2, or 10 days' call, which means that the contract will determine 1 day, or 2, or 10 days after the call has been made; frequently it is agreed that the pledge shall be payable within an hour, or a number of hours from the call; again, it may be agreed that a contract shall run 30 or 60 days, or more, and thereafter continue on call.

The hypothecation is not narrowed to a mere contract for the payment of money, for it may apply to any other lawful engagement where value is pledged for the performance of an undertaking, and it is open to all persons who are not incapable of contract by law, which debars idiots and lunatics, married women, persons under disabilities, and those incompetent by reason of age or weakness; minors, however, may hypothecate, for their contracts are not void but simply voidable, and then only by their act and choice; and factors may pledge goods in their hands for the amount of their lien upon them but not more, as the law only gives them that degree of possession and title. And the pledge applies not only to the principal but to the interest of the debt, even after it has become due while it remains unpaid, through an improper delay of the debtor. Pledges or loans for a fixed time are usually discounted, but the interest on "call" loans, although not due until the loan is paid, is, in many cases, collected at intervals. The pledge applies also to any charges that may be fairly made for the care and maintenance of the security, such as for storage, repairs, or insurance, and the pledgee cannot be held, but he may hold the debtor, for any loss or destruction of the security through unavoidable accident; and in the case of such loss of a part, the rest of the security may be held for the whole debt. All increase of the collateral security, such as interest, dividends, or other profit, may be kept by the pledgee as further security for the debt; an indulgent custom, however, permits the claim of this income by the debtor, and although the pledgee cannot be compelled to release any part of the security by the payment of a portion of the debt, yet it is usually agreed that if certain parts of the collateral are sold, or are required by the debtor, he may regain possession of them from the pledgee (for delivery to the purchaser or other purpose) by payment of their rated portion of the debt. Unless it is so stipulated, the pledgee cannot hold the collateral for a former debt due him by the pledgeor, nor can it be held for a subsequent debt, unless it should appear that the new loan was made upon the security of the former pledge, in which case the collateral could be made by the pledgee to apply to all the debts. And the pledgee may hypothecate securities that have been hypothecated with him; provided, always, that his pledge of them is not for a greater debt than they represent to him.

An important feature of the usual form of hypothecation is the provision made for the protection of the pledgee, should the fluctuation of values during the term of the pledge destroy any part of the security which the contract bore at the time of making; this is called the margin, and it is the difference by which the property pledged is superior in value to the debt or loan. This margin is gauged by the character of the collateral, being small or large in the proportion that the price of the security is stable or varying. And there is usually an agreement in the contract that if the fixed rate of margin be not maintained, and the impairment of the margin through a decline in the price of the collateral, not supplied after a certain agreed upon notice, the contract shall determine. And in such a case, or if the engagement has not been otherwise properly carried out, or if the pledge be not redeemed when it has become due (either by the lapse of its term or by the call of the creditor), then the pledgee has the right to recover his debt by the sale of the security for it, and by a sale only; for the debt cannot be satisfied by the pledgee's retention of the pledge; and, unless it is otherwise stipulated, this sale must be judicial and after formal notice to the debtor, who in this case has still the right to redeem his property. But it is usually agreed that these privileges shall be waived, and that the sale may be in the open market or privately, and without notice to the debtor. And at this sale the pledgee cannot become a purchaser of the pledge or any part of it, unless it is expressly stipulated in the contract that he may, provided he shall be the highest bidder; usually, however, pledges are sold at public auction or in the exchanges, as the courts scrutinize closely all private sales, and their validity is open to attack. Where several things are pledged, each with its increment may be sold to extinguish the debt, but the sale must stop when the debt is satisfied, and the remainder unsold or arising from the sale of a part must be turned over to the debtor.

Creditors of the pledgeor who have so-called privileged debts may precede the pledgee; generally, however, creditors take place according to the date of their claims, but a point of law is that any creditor who has a superior claim "may maintain it and receive full compensation from the fund before the creditor who holds under a mere contract of pledge from the debtor." The debtor may hold the pledgee responsible for any neglect or failure to do his whole duty, and where negotiable instruments, such as notes, are pledged, for any compromise the pledgee may effect with their makers; and when the terms of the contract give the pledgeor the right to cancel the debt by tender of its payment after proper notice to the pledgee, then the pledgee must deliver back the possession of the pledge and its increment, upon satisfaction of his claim; but the debtor cannot recover the title to his property from a *bona fide* purchaser, when by a breach of trust the pledgee thus disposes of the security. The common law requires a pledgee to satisfy himself fully as to the integrity of the pledge, and the debtor's title to it; thus great care is used in exactly determining the right of the debtor to pledge property of which he is agent or trustee; also the right to pledge of a husband acting for his wife, for the law is not inclined to protect a pledgee, if, unknown to him, there is a fatal flaw in the collateral. (E. C.)

I.

IBERVILLE, Pierre Le Moyne, Sieur d' (1661–1706), a Canadian commander, founder of Louisiana, was born at Montreal, July 10, 1661. He was one of eleven brothers, named Le Moyne, several of whom attained distinction in the French service. Pierre entered the navy as a midshipman in 1675, and served in the overland expedition of 1686 against the English forts on Hudson Bay. In 1688 he went again and captured two English vessels, and in October, 1694, he captured Fort Nelson. He had now attained the rank of captain of a frigate, and in 1696 with three vessels he entered the Bay of Fundy, defeated three English ships, captured St. John's, and destroyed Fort Pemaquid. In 1697 he again went to Hudson Bay, defeated three English vessels, and reduced Fort Bourbon. In 1698, being sent from Brest to occupy the mouth of the Mississippi, he set sail Oct. 24, found Pensacola occupied by Spaniards, and on Jan. 31, 1699, anchored in Mobile Bay. Then taking his brother Bienville (see Vol. I.) and 50 men, he proceeded in two barges to the mouth of the Mississippi, which he reached on March 2. After ascending the river for some distance he received from the Indians a letter which had been left by Tonty in 1686 for La Salle. He built Fort Biloxi, and sailed for France in May, 1699. Returning early in the next year he built a new fort some distance up the Mississippi, and sent a party under Le Sueur to the copper mines of Lake Superior. In December, 1701, his colony, having suffered from fevers, was transferred to Mobile. In 1706 he captured the Isle of Nevis, and he was preparing to attack the coast of Carolina when he died at Havana, July 9, 1706.

IBSEN, Henrik, a Norwegian poet and dramatist, was born at Skien, March 20, 1828. He was a druggist, but having gained renown by his drama *Catilina*, went to Christiania, in 1850, for the purpose of further study. In 1851 he was called to take charge of the National Theatre at Bergen, founded by Ole Bull. In 1857 he accepted a similar position at Christiania, and in 1863, having obtained a travelling pension, he went as far as Rome. Since 1866 he has lived at Dresden and Munich, being in receipt of an annual pension. Among his earlier dramas were *Gildet på Solhoug* (1856); *Fru Inger til Östrat* (1857); *Härmändene på Helgeland* (1858). Later came *Kongs-emnerne* (1864); *Brand* (1866); *De Unges Forbund* (1869); *Keiser og Galiläer* (1873); *Samfundets Stötter* (1877); *Gjengangere* (1881); and *En Folkefjende* (1882).

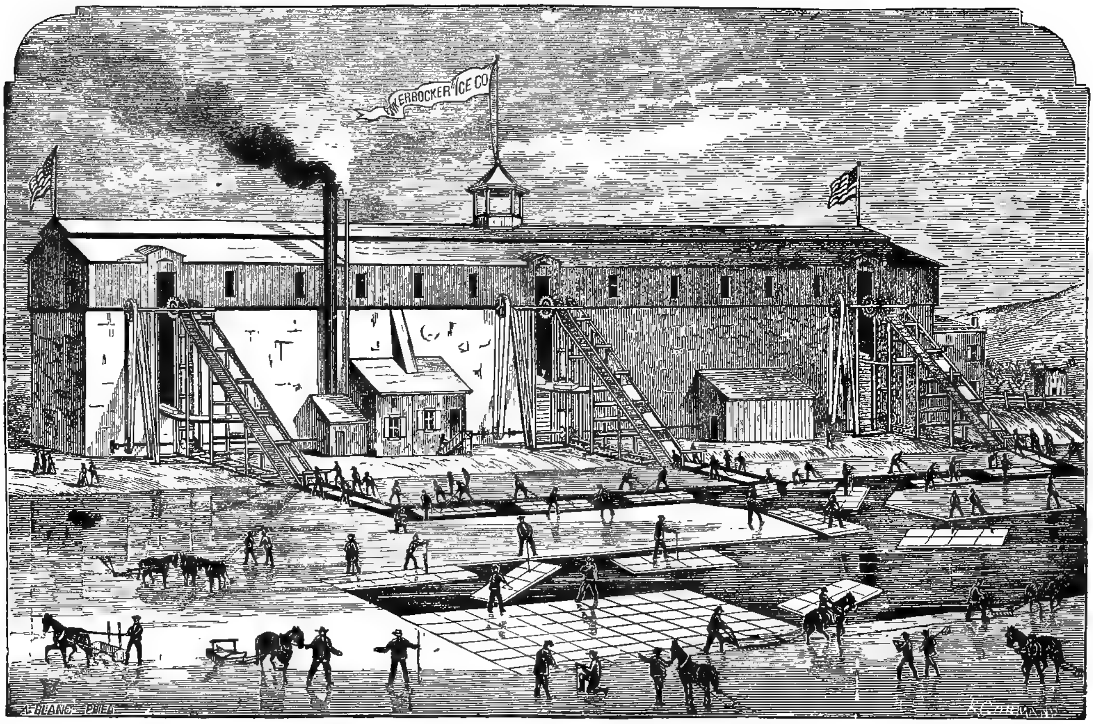
See Vol. XII. p. 646 Am. ed. (p. 611 Edin. ed.).

ICE, the solid form assumed by water at the temperature of 32° Fahr. When reduced to this temperature water solidifies, expanding as it does so with such extreme force as to rend thick iron receptacles in which it may be confined. In freezing it loses much of its contained heat. In returning to the liquid state this lost heat must be regained, and the melting of ice is considerably retarded by this necessity. The congelation of water takes place under several conditions. In the form of hail it is due to the exposure of condensed moisture to low temperatures in the upper air. If the moisture is frozen before condensation, it yields snow, a form due to the loose aggregation of minute ice crystals. By compression in mountain valleys or ravines snow is reduced to ice, and takes the glacier form. More ordinarily ice is produced by the freezing of the surface-layers of streams, ponds, and lakes, or their congelation to the bottom if the cold be sufficiently intense. In more northerly regions the freezing extends to open bays and gulfs, and in the Arctic seas to the whole surface of the ocean. On Arctic lands glaciers of enormous extent are formed, and the masses which are broken from the front of these and drop into the ocean constitute the icebergs which are drifted into the temperate seas by polar currents. One important property of freezing ice is that it discards impurities and dissolved matters. This may be experimentally proved by the mixture of coloring matters in water. If now frozen, the ice will be found to be colorless and transparent, while the coloring matter is concentrated in the remaining water. Thus very impure water may furnish pure and wholesome ice. Bubbles of gas, or water included in the ice through irregular freezing, may contain impurities, yet the ice itself is free from them. Thus the best ice is that which is least porous, which renders the steadily freezing, compact, and dense ice of the colder regions of superior commercial value. It is also affirmed that the ice of the more northern localities melts more slowly, from its superior density, but that is questionable. The same quantity of actual ice must take the same time to melt, whether porous or not.

Ice has been used for domestic purposes since an early era, its first employment being in the form of snow gathered from the mountains. This commercial use of snow is still practised in Italy, Spain, and some other countries. Ice has also been long used by the wealthy, being gathered from ponds on their estates, and stored for summer use. It has become a commercial article only within the present century, and that mainly in America. In London it was not sold to private consumers until 1845, though it had been previously in demand by fishmongers and confectioners. In the Middle States of America it has been stored for domestic use for nearly two centuries, in deep cellars, in which the ice was surrounded by sawdust or some other non-conductor. It became an article of commerce much later, and up to 1820 it was a scarce and dear commodity in the Northern cities, and not used in the South—deep wells and spring-houses partly obviating its necessity. It was sold on a small scale to consumers in Boston early in the century, but in New York there was no private demand before 1825, though it was much used previously by butchers, fishmongers, and probably in some other industries.

The first attempt to transport ice to tropical America was made by Mr. Frederick Tudor, of Boston, in 1805, in which year he took a cargo of 130 tons to Martinique. He continued in this business without opposition and with little profit for many years. In 1815 he obtained a monopoly of the Havana trade, and afterwards extended his enterprise to Charleston, Savannah, and New Orleans. Yet in 1832 his total shipments amounted to 4352 tons, all taken from Fresh Pond, Cambridge. In addition to the above-named places he sent ice to Brazil and to the East Indies, in which latter country he sold it at half the price of the ice collected by the natives. Until 1836 the whole shipping trade remained in his hands. Then competition entered, and the ice commerce rapidly increased. The total shipments from Boston to all ports, from 1805 to 1856, were 230,000 tons, of which 146,000 tons were shipped in the latter year. From 1856 to 1872 the total trade covered 2,768,000 tons, there being 225,000 tons shipped in 1872. Since then the Boston trade has met with opposition from other quarters, and has fallen in importance—New York and Maine coming into active competition. In 1874 the total export to foreign ports was 20,000 tons. In the year ending June 30, 1885, it was 38,901 tons, thus showing a considerable increase. Very little of this ice is sent to England, the English market being more cheaply supplied from Norway.

In Europe, indeed, there is a very small ice consumption as compared with that of America, in which country it has grown very large. In addition to the very large quantity stored by the cities of the North



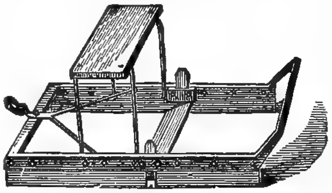
Ice-cutting Scene, with the Endless Elevating Chain in Operation.

for their own consumption, much ice is sent South, both from the Atlantic seaboard and from the cities bordering on the great lakes, such as Chicago, Cleveland, Buffalo, etc., which ship ice by rail, or by boat down the Mississippi. It may be said here, however, that the Southern trade is lately much reduced, through the growing use of ice-making machines, and is now mainly confined to cities easily reached by water.

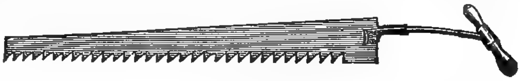
Of the principal Northern cities the ice supply of New York is mainly taken from the Hudson; that of Philadelphia from the Schuylkill, Delaware, and Lehigh, and from the Kennebec River and other localities of Maine; and that of Boston from Fresh Pond, Wenham Lake, and other neighboring bodies of fresh water; while the cities of the West draw their main supply from the great lakes. The ice is stored in huge ice-houses, generally of wood, with double, triple, or quadruple walls, the interspaces filled with sawdust or some other non-conductor of heat. These ice-houses vary greatly in size, some being great clusters of buildings, capable of holding from 20,000 to nearly 80,000 tons. As for the consumption of the several cities, it may be stated that the ice at present cut for the supply of Philadelphia averages about 700,000 tons annually, and of New York and the surrounding cities about 1,200,000 tons. These estimates will apply to other cities, with a variation in proportion to population—the estimated use of ice in the Middle States being 1600 pounds annually per individual. In addition to that collected for sale, there is a very large private collection by brewers, butchers, and others, but principally by farmers and dairymen in rural regions, so that the total consumption of ice in America would foot up an enormous sum.

Of the eastern ice supply the two great sources are the Hudson and Kennebec Rivers—the great bulk of the ice-trade being in the hands of the Knickerbocker Ice Companies of New York and Philadelphia, these being separate organizations, though bearing the same title. The Kennebec ice is claimed to be the clearest and finest gathered anywhere in the world. This furnishes a large part of the Philadelphia supply and of the foreign shipments.

The methods of gathering the ice-crop are wholly of American origin. The requisite thickness of ice for the home market is from 9 to 12 inches, and for exportation 20 inches. In collecting it the surface is first cleared of snow and porous ice by the Snow Plane, which is drawn by horses. The surface of the ice-field is then mapped out into large squares by the Marker, which, after cutting its first groove, is directed in parallel lines by a permanent guide attached to it. The Plow, adapted for various thicknesses of ice, then cuts the shallow grooves made by the Marker two-thirds through the ice. Plows are made with or without guides, as may be desired. Some blocks being sawed out and removed so as to leave a space of open water near the elevator, other blocks are then floated into position by the help of ice poles, and are split off into sizes convenient for handling by means of a Splitting Chisel or Bar thrust into the plow-grooves. These detached masses are floated to the foot of the inclined plane, up which moves by steam-power an endless chain, with shelves at intervals, which carry up the blocks of ice, separated as they here are into the required size for storage. A late attachment to the elevator planes the ice as it passes to the storehouse, so dispensing with the Snow Plane, though cleaning the ice before it is cut has obvious advantages in some of its superficial conditions. These squared blocks are laid side by side in the building, so as to leave no



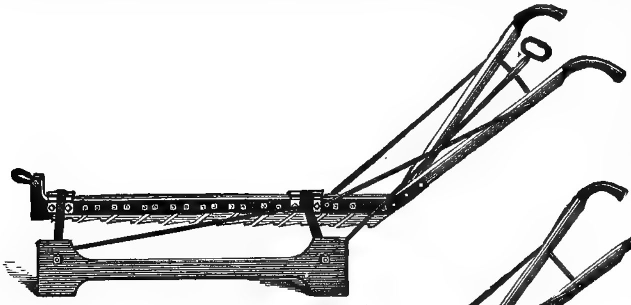
Snow Plane.

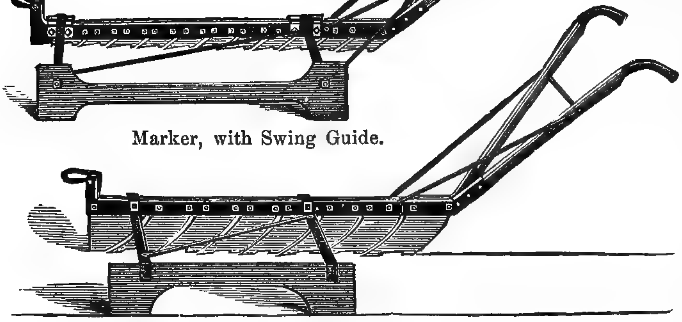


Ice Saw.

Splitting Bars.

spaces. The cost of labor in ice-gathering has been reduced by the use of improved machinery, until it is not more than 8 or 10 cents per ton in favorable seasons. The great cost is in the wastage by melting and the expense of delivery. The cost to large consumers was formerly $20 to $25 per ton, but has been reduced to about $5 per ton to large users, and $9 per ton to householders, the difference being due to increased wastage and expense in delivering in the latter case.


Marker, with Swing Guide.


Plow, with Stationary Guide.

For many years past machines for the artificial manufacture of ice have been in operation. These have become now very effective, and their use is rapidly extending in warm regions. As yet they have not been able to compete with natural ice in Northern cities, since the ice made by them has cost from $4 to $8 per ton. But in the South they are coming more and more into use, and reducing the ice commerce. In 1880 there were 35 establishments in the United States engaged in the manufacture of machine-made ice, with a capital of $1,251,200, and an annual product valued at $544,763. The main seats of this industry were Louisiana and Texas, while Georgia and California came next in order. More recently it is claimed that machines are in existence which will make ice at a cost of from $1 to $1.50 per ton, and a Chicago company has proposed to the ice-gathering companies to furnish them with machine-made ice at a cheaper rate than river ice can be furnished. This claim, however, remains to be practically proved, and there is an unwarranted prejudice against machine-made ice to be overcome ere it can be generally used.

Until within recent times the only use made of ice was in the cooling of drinks. It is now very largely employed in the preservation of meats and other perishable articles of food, while the employment of refrigerating cars and vessels has enabled great quantities of meats, tropical fruits, etc., to be transported for long distances, and delivered in a fresh state to consumers. Large quantities of ice are also used by brewers, and by other industries that require a low temperature. In many instances ice-machines are employed to produce cold without making ice, the required effect being thus gained at reduced cost. Another important recent use is the preservation of dead bodies until ready for burial. The use of ice in medical and surgical operations is equally important, it being employed in fevers to cool the mouth and reduce the internal temperature, while it is applied externally in other cases, and locally to produce partial insensibility of the tissues in surgical operations. Its value in the preservation of the public health renders it one of the most important of industrial products.

(C. M.)

IDAHO. This Territory was organized by Congress as a separate Territory, March 3, 1863, from portions of Nebraska, Dakota, and Washington. At this time it included all of what is now Montana and the larger part of Wyoming, and had an area of over 375,000 square miles. In 1863 it was reduced to its present limits.

See Vol. XII. p. 736 Am. ed. (p. 697 Edin. ed.).

The Territory is of very irregular shape, long from north to south, and very narrow on the northern boundary. On the map it appears not unlike a gigantic easy-chair, with the top towards the north and fronting the east. The length, north and south, on the western border, is 485 miles; east and west, on the southern border, it is 300 miles; from the south-eastern corner it extends north along the border of Wyoming for a distance of 130 miles, and then follows the ridge of the Rocky Mountains irregularly in a north-westerly direction to the northern boundary, where it is only 45 miles wide.

At present the Territory contains an area of 84,800 square miles, or 54,272,000 acres, and ranks twelfth in area of the political divisions of the United States. It is nearly as large as Pennsylvania and Ohio combined. The lands of the Territory have not been fully explored and surveyed, and the classification is only approximately made. These lands are defined as agricultural, desert, timber, and mineral. As now found, and without artificial aids, all the lands suitable for agricultural purposes are estimated at from 12,000,000 to 15,000,000 acres, and are mostly found in the valleys of the larger streams. That which is capable of being reclaimed for agricultural uses by irrigation with the available water now flowing in the rivers and larger streams is put at from 10,000,000 to 12,000,000 acres more; a considerable portion of this land is now considered as grazing lands. The natural grazing lands, unfit for agricultural use by any practicable means, are estimated at 5,000,000 acres. The timbered lands are almost wholly in the northern part, and are estimated at 10,000,000 acres. The mineral lands comprise about 8,000,000 acres, while fully 5,000,000 acres are totally unfitted for any use, so far as is now known.

The present population can only be vaguely estimated; scattered, as it is, widely, and subject to great fluctuations. The report of the governor for 1884 placed the population at that time at 80,000. The report of another governor for 1885 estimates the population at 75,000. The development of certain minerals and the large influx of miners account for the differences of estimate. The most reliable statistics are those which were gathered by the general government in 1870 and 1880. These, as regards the population, appear in Table I.

Statistics.—Table II. exhibits the farm areas and farm values by counties for the year 1880.

The assessed valuation and taxation of the Territory in recent years appears in the subjoined table:

	Valuation.	Receipts.
1880	$6 408,089	$100,826
1881	8,066,366	56,526
1882	9,108,450	47,103
1883	13,938,412	51,801
1884	15,497,598	50,909
1885	15,973,601	

The mining property of the Territory is not taxable; if it were, the above showing would be more than doubled. The indebtedness of the Territory was, in 1872, $132,217.71. On Jan. 1, 1885, it was $69,268.60. On Jan. 1, 1886, it was $46,268.60, with cash in the public treasury to the amount of $52,261.30.

TABLE I.—POPULATION.

Counties.			White.		Colored.		Chinese.		Indians.		Native.		Foreign.	
	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.
Ada	4,674	2,675	4,447	2.569	16	20	203	78	8	8	3,948	2,178	726	497
Alturas	1,693	689	1,554	369	1	5	128	314	10	1	1,202	286	491	403
Bear Lake	3,235	....	3,234	....	......	......	....	....	1	......	2,250	....	985	
Boisé	3,214	3,834	1,970	2,057	10	15	1,225	1,754	9	8	1,347	1,183	1,867	2,651
Cassia	1,312	....	1,289	....	......	......	22	....	1	......	1,135	....	177	
Idaho	2,031	849	1,271	415	......	2	738	425	22	7	1,001	205	1,030	644
Kootenai	518	....	493	....	3	......	7	....	15	......	373	....	145	
Lemhi	2,230	988	1,950	864	5	2	262	120	13	2	1,423	509	807	479
Nez Percé	3,965	1,607	3,684	837	6	4	198	747	77	19	3,184	609	781	998
Oneida	6,964	1,922	6,892	1,921	3	1	61	....	8	......	5,036	1,189	1,928	733
Owyhee	1,426	1,713	1,179	1,334	7	[illegible]	239	368	1	[illegible]	809	862	617	851
Shoshone	469	722	171	252	2	2	296	468	......	......	113	93	356	629
Washington	879	....	879	....	......	......	....	....	......	......	815	....	64	
The Territory	32,610	14,999	29,013	10,618	53	60	3,370	4,274	165	47	22,636	7,114	9,974	7,885

TABLE II.—LAND.

Counties.	Farms.	Average size.	Total acres.	Improved land.			Unimproved land.		Value of farms (land, fences, and buildings).	Value of implements and machinery.	Value of live-stock.	Value of products.
				Total acres.	Tilled.	Permanent meadows, pastures, etc.	Total acres.	Forest.				
Ada	256	316	80,853	62,842	49,235	13,607	18,011	6,091	$800,475	$84,545	$522,264	$517,809
Alturas	90	16	1,444	919	632	287	525	295	28,950	3,225	11,870	34,550
Bear Lake	169	70	11,794	11,604	3,668	7,936	190	....	138,050	23,380	81,731	52,865
Boisé	[illegible]	157	10,061	4,444	3,503	941	5,617	788	116,050	12,710	71,079	97,664
Cassia	143	142	20,248	7,336	4,086	3,250	12,912	....	110,900	15,963	106,319	44,122
Idaho	155	199	30,914	22,830	11,515	11,315	8,084	1,000	254,225	30,370	170,838	140,816
Kootenai	20	187	3,740	1,100	339	761	2,640	1,014	14,290	2,877	7,117	8,030
Lemhi	88	240	21,150	17,750	3,100	14,650	3,400	617	135,850	18,460	164,460	110,930
Nez Percé	258	141	36,377	18,992	14,679	4,313	17,385	180	546,460	70,240	260,067	210,600
Oneida	422	161	67,790	30,148	20,042	10,106	37,642	462	359,890	63,785	349,588	117,315
Owyhee	66	231	15,230	4,897	2,122	2,775	10,333	....	117,000	12,865	237,405	64,895
Shoshone	5	172	859	699	562	137	160	160	12,100	830	6,250	5,600
Washington	149	183	27,338	13,846	7,771	6,075	13,492	1,285	198,650	24,680	257,812	110,318
The Territory	1,885	174	327,798	197,407	121,254	76,153	130,391	11,892	2,832,890	363,930	2,246,800	1,515,314

The manufacturing interests of the Territory are yet in their infancy. The mining interest, grazing, and latterly agricultural have absorbed the attention of the settlers. The manufactures in 1880 furnished the following statistics:

Establishments	162
Capital	$677,215
Hands employed	388
Wages for year	$136,326
Value of materials	$844,874
Value of products	$1,271,317

The number of live-stock, with their production, in 1880 was as follows: horses, 24,300; mules and asses, 610; working oxen, 737; milch cows, 12,838; other cattle, 71,292; sheep, 27,326; swine, 14,178. The wool produced was 127,149 pounds; milk, 15,627 gallons; butter, 310,644 pounds; cheese, 20,295 pounds. The estimates made from local reports for the year 1885 are as follows: horses and cattle, 400,000 head, with a value of $15,000,000; sheep, 200,000 head, with a wool-crop of 1,000,000 pounds, worth about 13 cents per pound; the number of swine is placed at 40,000 head. The vegetable and cereal productions of the Territory for the year 1885 are as follows: barley, 274,750 bushels; Indian corn, 41,000; oats, 1,032,000;

TABLE III.—GOLD AND SILVER.

Counties.	Ore raised. Tons.	Total assay value of ore raised.					Ore raised and treated. Tons.	Average yield per ton.	
		Gold (ounces).		Silver (ounces).		Total.		Gold.	Silver.
Alturas	4,077.75	7,185.4	$148,535	145,477	$188,087	$336,622	908.00	$53.13	$65.45
Boisé	16,605.00	13,594.3	281,019	83,684	108,195	389,214	15,645.00	13.44	5.39
Idaho	500.00	604.7	12,500	....	....	12,500	500.00	20.00	
Lemhi	5,000.00	14,512.5	300,000	232,036	299,999	599,999	2,500.00	50.00	50.00
Nez Percé	300.00	290.3	6,001	....	....	6,001	300.00	15.00	
Oneida	500.00	604.7	12,500	....	....	12,500	500.00	20.00	
Owyhee	8,342.75	13,057.7	269,927	218,190	282,098	552,025	7,176.75	25.09	24.68
Washington	500.00	362.8	7,500	....	....	7,500	500.00	10.00	
Total	35,825.50	50,212.4	1,037,982	679,387	878,379	1,916,361	28,029.75	21.16	15.91

rye, 24,341; wheat, 1,154,000; hay, 140,053 tons; Irish potatoes, 457,307 bushels; tobacco, 1400 pounds; value of orchard products, $923,147.

Minerals.—The mineral resources of Idaho constitute one of its chief sources of wealth. The most extensive belt of the precious minerals, gold and silver, lies on the western slope and the spurs of the Rocky Mountains that enter the Territory in Oneida county, and run the entire length of it to Lake Pend d'Oreille, a distance of 410 miles. The mines have not been developed as greatly nor as rapidly as in other Territories; many difficulties have had to be overcome by the miners, not the least of which were the long and severe winters with short working seasons, and the great distance from railroad communication until quite recently. The annual output from 1883 to 1885 was about $7,000,000. Some of the richest placer mines of the country are in this Territory. There are also mines of copper, mica, etc. The production of the deep mines for the year 1880 is shown in Table III. The amount of bullion produced in the Territory is given in the following table:

Counties.	Gold (ounces).		Silver (ounces).		Total.
Alturas	250.3	$51,743	48,678	$62,936	$114,678
Boisé	19,336.1	213,666	65,330	84,465	294,695
Idaho	483.7	9,999	....	....	9,999
Lemhi	6,046.9	125,001	96,683	125,001	250,002
Nez Percé	217.7	4,500	....	....	4,500
Oneida	483.7	9,999	....	....	9,999
Owyhee	8,712.4	180,101	136,985	177,108	357,209
Washington	241.9	5,001	....	....	5,001
Total	29,025.5	600,010	347,676	449,510	1,049,519

Education.—The public-school system of the Territory is modelled after that of all the Western States of the Union. A great pride is manifested in projecting the best system possible for the education of the youth. The 16th and 36th sections of each township were set aside for school purposes, aggregating over 3,000,000 acres. This land is productive of little revenue up to this time, and the schools are supported by local taxation. The following table exhibits the school statistics for several years:

	1871.	1874.	1877.	1880.	1882.
Youth of school age (5–21)	1,592	4,010	4,028	6,000	9,650
Scholars enrolled	906	2,030	2,631	6,758	6,080
School districts	35	77	96	149	183
Schools	28	....	74	155	....
Receipts	$18,295	$23,516	$23,366	$51,530	$54,609
Expenditure	19,003	21,787	18,764	38,812	44,840

In 1884 the number of children was 12,000, distributed among 300 districts. The annexed report of the territorial superintendent of public instruction for 1885 exhibits the state of the schools for that year:

Counties.	Districts.	School-houses.	Schools.	Scholars.	Length of school year.	Youth of school age.	Total expense.
					Days.		
Ada	36	33	33	1,468	144	2,082	$26,921.46
Alturas	[illegible]	7	26	1,230	127	1,305	25,660.39
Bear Lake	12	12	12	724	84	1,523	4,431.90
Bingham	25	23	23	822	115	2,392	6,212.72
Boisé	13	13	14	327	67	462	6,507.84
Cassia	22	16	17	618	75	1,030	3,391.27
Center	5	1	5	135	36	202	4,136.14
Idaho	13	10	13	160	36	432	1,689.81
Kootenai	4	4	4	179	22	179	1,468 77
Lemhi	9	7	10	189	39	340	3,105.66
Nez Percé	45	34	47	1,490	208	2,045	16,338.53
Oneida	22	23	24	1,939	145	2,127	4,486.27
Owyhee	7	9	9	166	47	166	5,365.41
Shoshone	5	1	4	67	18	188	1,729.85
Washington	21	12	17	523	73	836	3,651.62
Totals	273	205	248	10,037	1,240	15,399	$115,097.64

Railroads.—There are three railroads through the Territory, aggregating 820 miles within its limits. These are the Utah and Northern, 208 miles; Oregon Short Line—main line 452 miles, Wood River branch 70 miles—together 522 miles, and the Northern Pacific, 90 miles. Notwithstanding its high altitudes and rough surface, the facilities afforded by the valleys and mountain passes for railroad-making are equal to those of any Territory on the plateau. (A. G. M.)

IDEALISM is a term applied to the doctrine of those schools of philosophy which find their basis in consciousness as distinguished from those which fix their beginning in sensations. It stands in marked contrast with sensationalism because of the fact that the latter bases its reasonings and results upon the facts of an external world, while the former relies upon an analysis of self (*Ego*). This indicates the normal use of the word in its application chiefly to modern philosophy. The same title however is applied to all systems which deny reality to the outer world and its impressions, or which find their starting ground in abstract conceptions.

Idealism is usually regarded by metaphysicians as developing itself in two phases, viz.: subjective and objective idealism. When the innate faculties of the human mind are made the primary subject of investigation, and from their intuitions and relations a philosophical system is predicated, we have *subjective idealism.* If, however, a step higher is taken, and Being in the abstract is the theme of contemplation, when the thinker and the world on which he gazes are lost in a higher and eternal principle, the limited and conditioned in the unlimited and unconditioned, and this is the starting-point of theory and reasoning, we have what is called *objective idealism.* This term, however, is used by philosophers generally rather as a convenient form of phraseology than because it is defensible on the ground of accurate definition; some contending that "the proper association of the absolute is with the *not me*" and that on this account objective idealism is a misnomer.

The ideal philosophy is to be traced as far back as the Eleatics. Among these, Parmenides, of Elea (fl. 500 B. C.) seems to be the first to justify this appellation. He united with the early Greek philosophers in the continuous search for the primitive force or origin of things. Instead of accepting the modes of matter as explaining the existent order, he sought for some abstract conception of power. Rejecting the anthropomorphic representations of his predecessors he insisted that "Only being is, non-being is not, there is no becoming." Plurality and change were declared to be only appearances. We cannot know anything except as it has been the subject of thought and this is the proof of its reality, for only that which exists is thinkable. The senses he claimed are perpetually vehicles of deception by which men are seduced into deceitful and rhetorical discourse about things which are plural and changing. This marked advance on the earlier philosophy, which had been based entirely on sensuous perceptions, prepared the way for Zeno, who led the way into more abstract realms of investigation, and who was followed in like endeavor by Melissus, of Samos.

The nearest approach among the Greeks to the spirit of modern idealism is found in Plato. His philosophy turns mainly upon his theory of ideas. To him the idea was the archetype according to the pattern of which all individuals, properly belonging to its class, were made. At times, indeed, he seems to call in question the individual and localized object as a real existence; it is merely a phenomenon, or appearance, while real being is affirmed of the idea. When you have thought, for example, of all kinds of trees, and then have removed from your conception everything that differs among them, there remains to you an idea of a tree which is not contingent or accidental, but which has real and unconditional existence. So of all things. The highest of all ideas is the idea of the

Good. This, in contravention of the Eleatics, he affirmed is higher than the idea of Being. The Good becomes a personality in Plato's thought, and is regarded as an ultimate source of power. Before God made the world he made its soul of three elements: the indivisible and unchangeable was one, the divisible and changeable was another, to which was added an intermediate substance between the other two; then the body or the visible world was made. Thus all apparent physical facts are accounted for by their precedent and governing or archetypal ideas.

Modern idealism had its rise with the powerful advance of the philosophy of Descartes (1596–1650). Starting with the statement that consciousness gives testimony to a number of impressions, some of which are apparently contradictory of others, he declares that he is incapable of making any other affirmative statement with certainty than this one, "I doubt." Instead of passing from this to downright scepticism, he proceeds to the recognition of the thoughts which this process has involved, and finally lays down his positive postulate from which an entire philosophical system is developed: "*Cogito ergo sum.*" The existence of mind as totally distinct from matter is regarded by him as a subject of positive proof. The property of the mind is in the possession of ideas, and these ideas are determined to be true on the sole basis of their distinctness or clearness. Since the idea of God is the clearest of all, the idea of an all-perfect infinite being, our consciousness itself furnishes direct proof of the divine existence. From this second point of departure Descartes ranges over the whole field of human knowledge. God has so created us that we shall not be deceived in the deductions of abstract science. Likewise our perceptions are affirmed to be true because a Being of infinite veracity could not have so formed us that our minds and senses would move in a constant realm of falsehood. The proof of the reality of the external world is contingent in this system upon the prior proof of the existence of God. The universe depends not only for its first existence upon the productive power of God, but equally so for its continued being. Creation is perpetual. This is very near objective idealism, to which indeed it was soon carried. Baruch Spinoza (1632–1677) seized upon that feature of the philosophy of Descartes which made the perceptions of the finite mind contingent upon the interposition of the divine power. Absolute perfection is only an attribute, he insists, of some perfect Being. The fundamental idea, therefore, is the idea of Being; that is, self-existent substance. God enshrines in himself all reality. Thought and extension are simply attributes. Substance, he declares, is that which exists in itself, and is conceived by itself, and which needs nothing else for its existence. God is indeed the only substance. All ideas are true so far as they are referable to God; for all ideas which are in God agree perfectly with their objects. The human mind so far as it knows things truly is a part of the infinite divine intellect. Reason apprehends things under a certain form of eternity. True and final knowledge is not of sensation or perception, but is in the apprehension of the essence of things. Thus we see that objective idealism has its legitimate end in pantheism.

In England pure idealism was carried to extreme conclusions by Bishop Berkeley (1684–1753). He declared that the supposed existence of a material world was not only incapable of proof but was positively false. He contended that we are immediately conscious and certain of the existence of our thoughts. We infer also that bodies different from our thoughts exist. This, however, is merely an inference, and is erroneous. There is no law of nature; what we mistake for it is the order of succession of our ideas. In short, as we can never get beyond our ideas, these ideas are the real objects of knowledge. He did not reject a phenomenal world, but denied that it was material. Arthur Collier (1680–1732), following Malebranche, developed a similar theory. Reid, of Scotland (1710–1796), based a system of philosophy upon consciousness, which has been termed "the philosophy of common-sense," in which he denied the representative character of ideas, and insisted upon the validity of our perceptions and of the observed facts of our consciousness. He was followed in methods and conclusions by Dugald Stewart (1753–1828), who carried the work to more satisfactory and scientific conclusion. The effect of their work was to destroy the sceptical conclusions of previous idealists. Unquestionably the most learned of English idealists was Sir William Hamilton (1788–1856). Adopting largely the method and terminology of Reid, he rescued this system from much that was inaccurate and misleading. He denies that we have any direct consciousness of the *Ego* or self. Our knowledge of mind as of matter is limited to its phenomena. The reality, or the being developing the phenomena, would be suggested by them. Of the outward world and of the categories of matter we have a direct and not a representative knowledge; but as to the nature of this *Non Ego*, whether it is made up of phenomena only, or whether it involves substantial being, seems to have been left by him in such doubt that his followers are by no means agreed in their interpretation of him.

Idealism was borne to its highest visions and most perfect realizations in Germany. The author from whom its greatest influence was derived was Gottfried Wilhelm Leibnitz (1646–1716). Originally a disciple of Descartes, he subsequently incorporated into his writings more of the spirit of Aristotle and Plato. It is exceedingly difficult, in a brief space, to give any adequate idea of his ideal philosophy. He developed a theory of monads, concerning which he claimed that everything is composed of an infinite number of them. A monad is simple unextended substance. These monads are not conceived of as atoms but as forces or ideas, each idea being a force. All monads are percipient; some are consciously so, and these he called appercipient. He who should know perfectly one single monad would in it know perfectly the world whose mirror it is. But these monads differ in the point from which they reflect the world, hence there are not in all the universe two monads precisely alike. It is not possible, he affirms, that the soul, or any other true substance, should receive anything from without unless through Divine omnipotence. The soul is the governing monad of the body. Matter, with its continuous extension, exists only in the confused apprehension of the senses. It is only a "well-founded phenomenon," which does not deceive the inquirer who is guided by the higher rules of reason. He affirmed the immortality and indestructibility of the soul, and at first declared that God was not the author of the harmony of the universe but was that harmony itself. Subsequently, however, he changed the latter statement. His writings constituted a controlling element in almost all subsequent philosophical thought in his own country. Immanuel Kant (1724–1804), the first prominent philosopher to follow Leibnitz, was an idealist so far as to give to his doctrine of the world a subjective origin, but his insistence upon the truth that the material of thought is in the external world seems to class his philosophy as of a dual character. His idealistic tendency culminated in Fichte, Schelling, and Hegel. Fichte (1762–1814) affirmed that "the matter of representations was not derived, as Kant had affirmed, from the action of things in themselves on the agent of representation, or the percipient subject, but that both matter and form were the result of the *Ego*, and that they were furnished by the same synthetic act which produces the forms of intuition and the categories." The contents of our experience are not the consequence of outward phenomena but are the product of our own creative faculty. This power of creation is the ground of all consciousness. The *Ego* posits itself and the *Non-ego*. This *Ego* is not the individual but the absolute. Friedrich Wilhelm J. Schelling (1775–1854) combined the methods of Fichte and Spinoza, and produced what is known as a system of identity. The absolute involves every individual and every category. Here the real and the ideal, the object and the subject, nature and spirit merge into one. He insists that the necessary tendency of all science is to pass from nature into intelligence. The perfect theory of nature would be the resolution of all nature into intelligence. Nature, therefore, finds her highest end and her real existence in reason. Matter, he affirms, is extinct mind, and all the forces of nature are reducible in the last resort to powers of ideal representation. But George W. F. Hegel (1770–1831) developed from this principle of identity, suggested by Schelling, in combination with Fichte's methods, a system of absolute idealism. He contended that phenomena do not exist simply in the consciousness of the individual *Ego*, but are phenomena *per se*, *i. e.*, that they have an existence in the divine idea. This idea, or the absolute reason, is revealed in nature and spirit, and, having reproduced itself in human thought, returns after this alienation to itself. A "thing in itself" is an abstraction, it is the mere reflection of the thing into itself, in distinction from a reflection of itself into others. Hence the final reality must be sought apart from a world of mere phenomena. Rudolph H. Lotze (1817–1881), a more recent idealist, proclaimed, with slight modification, a similar view, contending, however, that goodness is the ultimate idea, and that everything exists only because it has a necessary place in its expression.

For idealism it is claimed that it is the true method in philosophy, since the mind can only be known by an investigation of its own phenomena, and that it emancipates men from the gross and sensuous by determining the reality of that which is super-sensuous and spiritual. Under its influence legislation is said to have taken higher ground, by recognizing the inherent claims that lie in the nobility of human nature, while religion recognizes in this mode of philosophic thought a congenial handmaid.

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(T. A. K. G.)

IDIOCY. See INSANITY.

IGNATIEFF, NIKOLAS PAULOVITSCH, a Russian general and diplomatist, was born at St. Petersburg, Jan. 29, 1832. His father, a captain of infantry, had been the first army officer to acknowledge Czar Nicholas on his accession to the Russian throne in 1825, and hence was an object of imperial favor. The son had the czar as god-father, and was educated in the corps of pages and in the Nicholas Academy. In 1849 he entered the Imperial Guard, and during the Crimean war he served on the staff of Gen. Berg in the Baltic provinces. After the war Ignatieff was made military attaché to the Russian embassy at London, and his report on England's military position in India attracted the attention of Alexander II. In 1858, being now a colonel and aide-de-camp to the emperor, he was sent on a special mission to Khiva and Bokhara. In 1860 he was a major-general, and was sent as plenipotentiary to Pekin, where he negotiated a commercial treaty with China, and also obtained the cession of Ussuri. On his return to St. Petersburg Ignatieff took charge of the Asiatic department in the ministry of foreign affairs. On July 26, 1864, he was appointed minister to Constantinople, and in 1867 was raised to the dignity of ambassador. He directed himself steadily to the advancement of Russian interests, moved cautiously during the Cretan insurrection, protected the Bulgarian church party in their contest with the Greek patriarch, and acquired a strong personal influence with the sultan, as well as general popularity. But in 1876 the troubles in Servia gave to Russia a pretext for armed interference, while England gave Turkey encouragement in resisting such action. A change in the Turkish ministry transferred to Sir Henry Elliot, the British ambassador, the influence long wielded by Ignatieff. Servia was defeated in her struggle with the Turkish empire and compelled to sue for peace, yet the threats of Ignatieff enabled her to get two months' truce. while representatives of the Great Powers held a conference on the situation. The conference, however, failed to obtain satisfaction from Turkey, and in March, 1877, Ignatieff visited Berlin. Paris, Vienna, and London, ostensibly on account of his eyes, but really to ascertain the disposition of the other Great Powers with reference to the war which Russia was now determined to wage. After the war Ignatieff was the chief representative of Russia in negotiating the treaty of San Stefano, March 3, 1878, and then went to Vienna, where he effected an understanding with the Austrian government. He took no part in the Congress of Berlin, and in the last two years of Alexander II.'s reign resided at Nice. On the accession of Alexander III., in March, 1881, he was called to be minister of public lands, and in May to be minister of the interior. This position he held for one year only.

See Vol. XII. p. 742 Am. ed. (p. 703 Edin. ed.).

ILLINOIS was the eighth State admitted into the Union under the Federal Constitution. Congress passed the act April 18, 1818, and the Territory was admitted on Dec. 3, 1818. It contained at that time a population of 40,000. It ranks twenty-first among the States in area, having, by the latest surveys, 56,650 square miles, or 36,256,000 acres. In 1870 it reached the fourth rank in population, and remained the same in 1880. Its population in the latter year was 3,077,871, classified as follows: males, 1,526,523; females, 1,491,348; native, 2,494,295; foreign, 583,576; white, 3,031,151; colored, 40,720. The population in 1886 was about 3,500,000, of which 650,000, or nearly one-fifth, was in the city of Chicago. In 1884 the rank of the State was first in corn, wheat, oats, meat-packing, lumber traffic, horses, malt and distilled liquors, and in the number of miles of railway operated. It ranked second in rye, coal, agricultural implements, and soap. It ranked fourth in hay, potatoes, iron and steel products, mules, milch-cows, and in oxen and other cattle.

Topography.—The greater part of the State is a high, grassy plain. Except Delaware and Louisiana, it has the most level surface of any State in the Union. In the central and eastern parts the surface is level, often stretching out into what is termed "flat prairies." The highest point in the State is in the north-western part, between Freeport and Galena, where the elevation reaches 1,150 feet above the level of the sea. At the extreme southern part the elevation is only 350 feet, and the average for the entire State is less than 500 feet. The interior is traversed by numerous streams, along the borders of which are bluffs and broken land, so that the surface is not one vast prairie but is composed of many small prairies, separated from each other by these streams, along which growths of timber are found. The State lies midway in the Great Central Plain of the continent, and contains some of the richest lands of the valley. The soil is a heavy, black loam, of great depth and inexhaustible fertility.

Climate.—The climate is as nearly that of season and latitude as can be found on the continent. The modifying influences are not many nor great. Yet among these must be noted the general fact that the topography of the Mississippi Valley, open, as it is, at both ends, and with an Arctic region on the north and the warm waters of the large gulf on the south, is favorable to sudden and violent changes of temperature. No mountain ranges intervene at either north or south, to check or modify the extremes of heat and cold which come from beyond. The State of Illinois is too far removed from either extreme to be subject to the severest of the changes, and yet sufficiently near to both to be influenced by them. In the north-eastern part of the State the presence of the lakes has some modifying influence on the climate, making it warmer in winter and cooler in summer than in corresponding latitudes outside the lake region. In other respects the climate conforms to latitude and seasonal changes. On the whole, it is salubrious, bracing, and pleasant. The malaria, which was once found here, has disappeared with the cultivation of the soil. The atmosphere on the prairies is almost constantly in motion, making even the highest temperature endurable. On the 40th parallel the mean temperature for the summer season is 77°; for the winter it is 33° 30′, while the mean annual temperature is 54°. The annual rainfall at the same latitude is 35 inches.

Minerals.—The State is underlaid in more than three-fourths of its extent by beds of bituminous coal of excellent quality and workable depth. The coal area is little short of 37,000 square miles, and is about one-seventh of the entire known coal-area of North America. The first coal-mine opened in America of which any record exists was at Ottawa in this State in 1669. The average annual coal-product for five years ending with 1885 was about 10,000,000 tons. (See COAL in Vol. II.) Along the Fox and Des Plaines Rivers are found vast quantities of limestone of a superior quality. It is quarried extensively for building purposes, and the well-known "La Salle stone" was used largely in rebuilding the city of Chicago after the destructive conflagration in 1871. The great central lead-deposit which is found in Wisconsin, Iowa, and Minnesota, extends into the north-western parts of Illinois. It constitutes an important mineral of the State. The richest and most extensive lead-diggings of the country are found near Galena. In Saline and Gallatin counties are found salt-wells, so rich that 75 gallons of the water produce 50 pounds of salt.

Agricultural.—All the factors necessary to successful agriculture conspire to give this State the pre-eminence. The soil is rich, level, free from stones and gravel, easily tilled and highly fertile. Every ingenuity of modern machinery is readily applied here. The rainfall is abundant and seasonable. The seasons are long enough and come with such regularity that little danger is experienced by the skilful farmer in managing any crop he may choose to cultivate. The State lies almost entirely within the celebrated "corn-belt" of the country, and this cereal is produced here with the greatest ease and abundance. Wheat and the other cereals can be raised in all parts, and wheat is cultivated extensively in the southern portions. According to the latest official reports the farms and farm values of the State are as follows: The number of farms of 3 acres and upwards is 235,741; the improved or cultivated land reaches 26,115,154 acres; the value of the farms, including land, fences, and buildings, is $1,009,594,580; the value of farming implements and machinery is $33,739,951; the value of live-stock as found on the farms on July 1, 1880, is $132,437,762; the total cost of all fertilizers used during the previous year was only $174,277, and this was chiefly in localities near the cities where market gardening was done; the estimated value of all farm-products sold, consumed, or on hand for the year previous to the census was $203,980,137. The following table shows the average product of the State for nine years, ending with 1880, in the principal cereals and vegetables. The column on the left shows the rank the State held among the other States:

Rank.	Crop.	Number of acres.	Number of bushels.	Yield per acre.	Value per acre.	Total value of crop.
1	Corn	7,879,399	224,499,337	28.60	$8.97	$70,749,491
2	Wheat........	2,326,591	30,438,354	13.2	13.15	30,034,369
3	Oats...........	1,688,238	49,558,899	30.2	7.61	12,740,356
3	Potatoes	133,618	10,273,875	78.	40.92	5,467,423
4	Hay...........	2,114,303	(*a*) 2,897,162	(*a*) 1.36	10.92	22,678,771
9	Buckwheat..	10,709	151,362	14.2	11.03	118,132
12	Tobacco	10,018	(*b*) 7,257,857	(*b*)73.4	53.11	515,207

(*a*) Tons. (*b*) Pounds.

The average yield for the five years ending with 1883 was as follows: Corn, 85,607,642 bushels; wheat, 41,473,752 bushels; oats, 14,280,819 bushels; rye, 2,382,587 bushels; barley, 682,547 bushels; buckwheat, 133,689 bushels; potatoes, 5,863,067 bushels; tobacco, 251,617 pounds; hay, 26,323,087 tons. The following table shows the report for 1885:

Rank.	Crop.	Number of acres.	Number of bushels.	Av. price per acre.	Total value of crop.
1	Corn ...	8,559,036	268,998,000	$32.8	$75,319,440
1	Oats....	3,290,081	107,968,000	28.5	25,912,320
11	Wheat	1,255,905	10,683,000	77.1	8,653,230
5	Flax ...	30,998	272,845		

Commerce.—Few States in the Union are more favorably located or possess greater facilities for commerce. The State has a river navigation of over 4000 miles, while Lake Michigan on the north-east gives free connection with the Atlantic ports. Lines of railway form a network in every section of the State. The commerce upon the lake is chiefly from the port of Chicago. The following exhibit of the water traffic of a single year will give some conception of the extent of this branch of commerce:

	Number of vessels.	Tonnage.	Number of crew.	Value of vessels.	Capital invested.	Gross earnings.
Lake.....	115	16,035.35	908	$970,300	$1,342,135	$1,243,975
River....	56	6,510.77	439	256,500	540,050	537,960
	171	22,546.12	1,347	1,226,800	1,882,185	1,781,935

The State has the greatest number of miles of railway of any State in the Union, Pennsylvania coming second and New York third. These run in every direction and reach every point of commercial interest. Over fifty distinct roads are found in the State, while the number of branch roads added makes the number ninety-five. The level and unobstructed surface of the State makes it exceedingly favorable for railroad building and operating, and the cost of construction and the labor necessary are comparatively trifling and easy. The State has over 9000 miles of railway track. The capital invested is more than $400,000,000; the funded debts over $250,000,000, other debts about $50,000,000. The total cost of construction and equipment was about $450,000,000. The freight traffic of all the roads is upwards of 35,000,000 tons annually, while the number of passengers transported rarely falls below 25,000,000 each year. The net earnings of the roads is about $80,000,000 annually. These roads all pay a tax to the State upon their assessed valuation, except the Illinois Central, which pays seven per cent. of its gross earnings.

Banks.—Every village of any considerable importance has a bank, either national or private, and the business transacted by all these banking firms is enormous. The clearing house in Chicago is second only to that of New York in the volume of business done. The following table exhibits the statistics regarding the national banks of the State, and the proportion of those which are located in Chicago:

	Illinois. 153 banks.	Chicago. 12 banks.
Capital stock	$13,673,600.00	$11,750,000.00
Surplus funds	4,195,183.27	2,691,600.00
Undivided profits	1,788,800.71	692,660.00
National bank circulation.	6,154,525.00	722,850.00
Individual deposits	27,693,719.52	40,970,736.93
United States deposits	710,460.48	145,079.72

Manufactures.—The State ranks high in its manufacturing interests, which rank has been attained in recent years. Grazing and agriculture obtained the attention of the first settlers, and it was not until the State had been fully settled and the population too great to find profitable employment in these pursuits that attention was turned to the development of the manufacturing industries. In 1880 the number of establishments was 15,549, with a capital of $140,652,066. The average number of persons engaged in manufactures was as follows: males over 16 years of age, 120,558; females over 15 years, 15,233; children and youth, 8936. The total wages paid the employés in 1880 was $57,429,085, and the total value of the products, $414,864,670. The largest and most extensive manufactories of the country in the line of agricultural implements are found in this State, chiefly in Chicago. Extensive manufactories of wagons, plows, buckets, and other wooden wares are found at Moline.

The centre of the live-stock traffic and of lumber is found in Chicago, and statistics have been given in the article on that city (see CHICAGO, in Vol. II.).

Religion.—Almost every denomination of the Christian faith is found in the State. Some of these are large and flourishing; most all of them have denominational schools and colleges for the higher education of their youth, while almost all are represented by one or more newspapers or other periodicals. The larger of the denominations have branch departments of their publishing houses in Chicago. The following table exhibits the number of the ministers and communicants in the several denominations found in the State, according to the official figures furnished in 1880:

Denomination.	Ministers.	Members.
Roman Catholic	409	390,000
Methodist Episcopal	790	128,181
Christian	650	82,250
Lutheran	345	76,000
Baptist, Regular	687	68,186
Presbyterian	405	42,889
United Evangelical	102	27,155
Congregational	251	23,115
United Brethren	254	15,482
Evangelical Association	178	12,100
Presbyterian, Cumberland	138	10,903
Protestant Episcopal	107	8,123
Dunkards	152	7,500
United Presbyterian	64	6,394
Methodist Episcopal, South	48	5,186
Methodist Protestant	114	4,900
Free Will Baptist	78	4,788
Second Advent	30	3,750
Reformed in U. S. (German)	18	3,720
Universalist	41	3,253
Anti-Mission Baptist	63	2,800
Friends	18	2,619
Reformed in America (Dutch)	22	2,106
Reformed Episcopal	11	1,950
Free Methodist	85	1,638
Winebrennarian	38	1,415
Reformed Presbyterian	6	1,200
Unitarian, Congregational	11	1,000
Wesleyan Methodist	34	875
Seventh Day Adventist	10	760
Moravian	4	611
Jews (total pop. 12,443)	8	570
Swedenborgian	8	456
Seventh Day Baptist	13	391
Primitive Methodist	4	250
Presbyterian, South	3	60
New Mennonites	2	150

Historical.—The early history of this State is somewhat similar to that of most frontier States, in the troubles with the Indians, and with lawless gangs driven from the Eastern States. The most notable of the Indian wars was that which commenced with the burning of Fort Dearborn and the massacre of the garrison, in 1812, by the Pottawatomies, and the Black Hawk war of 1831–32. This war culminated in the expulsion of the Indians from the State. A few years after this, trouble began with the Mormons in Hancock county. The Mormons had settled on the river, founded the town of Nauvoo, and erected a magnificent temple. Their doctrines, and especially their practices and their interference with the civil polity of the county, were very distasteful to other settlers. From 1839 to 1844 there was constant conflict and trouble between the Mormons and the settlers. In 1844 the destruction of a press by the Mormons in Nauvoo led to the suing out of warrants for the arrest of Joseph and Hiram Smith, the founders of the sect. The Mormons armed to resist the arrest, and the "Nauvoo Legion," a body of cavalry 2000 strong, was called to arms. A mob was raised at Warsaw, a few miles up the river, and the State militia of the county called out. Before anything was done leading to bloodshed, the Smiths went over to Carthage, the seat of justice, and delivered themselves up to the civil authorities. When the Warsaw mob learned of this, they turned aside from the road to Nauvoo and came to Carthage, where the two Smiths were shot and killed in the jail. These troubles resulted in the emigration of the Mormons to Salt Lake. During the Mexican war Illinois raised and equipped six regiments for the service. In the civil war of 1861–65 the State contributed largely of men and means for the struggle. The first call of Pres. Lincoln for 75,000 volunteers was made on April 15, 1861. In ten days after that the State had 10,000 volunteers enlisted, although her quota was but 6000. During the progress of the war the State contributed 259,092 men. Of these, 5888 were killed in battle, 3032 died of wounds received in action, 19,496 died of disease, 967 died in prison, and 205 were lost at sea, making a total loss of 29,588 in the war.

The State has sent two men to the Presidential chair, Abraham Lincoln and Ulysses S. Grant, both of whom were re-elected. She has furnished many prominent men in civil, military, and judicial positions. (A. G. M.)

See Vol. VIII. p. 159 Am. ed. (p. 173 Edin. ed.).

IMMIGRATION is the act of removal into a country of which one is not a native, for the purpose of permanent residence. The same act with reference to the country from which the removal is made is emigration. The migrations of individuals or communities have been almost first among the means by which countries have been developed, civilization spread abroad, and the wealth of the world increased.

The history of immigration to the lands now included in the United States is largely a history of the nation itself. The aboriginal element in the population is insignificant in numbers and influence, and practically every civilized resident of the United States is either an immigrant or the descendant of persons who immigrated to this land at some time within the last three centuries.

Early in the seventeenth century the great movements of population from Europe began. English colonists settled in Virginia, Massachusetts, and subsequently at many points on the coast from Canada to Georgia. The Dutch established settlements along the Hudson and in New Jersey. Louisiana was claimed by the French. Many colonists of that nation settled along the Lower Mississippi and established forts connecting their possessions there with the colonies in Canada. Spanish adventurers founded, after repeated unsuccessful attempts, permanent settlements in Florida, though the province was afterwards ceded to the English and remained under their control for twenty years. Pennsylvania received early in the eighteenth century large accessions of population from the German districts along the Rhine. The descendants of the European colonists, with the slave population, numbered when the Revolutionary war had closed about 3,000,000 persons. These constituted the infant nation, and subsequent additions to the inhabitants by immigration, though from the same sources, constitute the foreign-born element of the population of the United States considered as a political body.

The Revolutionary war, creating a strong enmity between the new nation and the country from which its colonists had been principally drawn, discouraged immigration, and subsequent events in European history were influential in the same direction. The wars which the French Revolution and the conquests of Napoleon Bonaparte engendered attracted the adventurous spirits who might otherwise have sought the new republic established in the Western continent. The government of the United States by the constitutional provision forbidding any immediate attempts by Congress to suppress immigration, and by its early enactments providing for naturalization, encouraged settlers from all parts of the world. The laws at first provided that only two years' residence in the United States was necessary before an alien could become a naturalized citizen. The period of residence preliminary to citizenship was increased to five years in 1795, and in 1798, in a sudden fit of opposition to the incoming of aliens, to fourteen years. The present period of five years was again fixed in 1802. All the offices in the republic except those of president and vice-president are entirely open to the foreign-born citizen.

No record of the number of immigrants was kept until after the passage of the law of 1819, and estimates as to the number who came to this country before that time have greatly differed. The most generally accepted estimate is that of Dr. Young, of the Bureau of Statistics, who placed the number of those who arrived between 1776 and 1820 at 250,000. Other estimates have been : Mr. Blodget, 4000 a year from 1789 to 1794 ; Dr. Seybert, 6000 a year from 1790 to 1810 ; Prof. Tucker, 50,000 from 1790 to 1800 ; 70,000 from 1800 to 1810, and 114,000 from 1810 to 1820 ; making 234,000 from 1790 to 1820.

The condition of many of the immigrants who came to the United States before 1819 had excited much sympathy. They were crowded between the lower decks of emigrant vessels by agents who had hired the space from the ship-owners. The long voyages in slow sailing vessels and the crowding in insufficient space resulted in a mortality which frequently exceeded 10 per cent. of the number of passengers. Nor was the condition of the immigrants, when they had landed, greatly improved. The passage-money of nearly all of the immigrants had been paid in advance by agents, and the labor of the newly arrived foreigners was relied on to reimburse the agent and to secure for him an exorbitant commission. The immigrants—children as well as adults—were made "indented servants," and their labor for periods of from three to ten years was sold at public auction to the highest bidder. The system led to cruelty, and prevented the immigrants from gaining the full benefit of their change of residence. The evils of the system of importing aliens for indenture were for the most part remedied by the act of Congress passed in 1819.

Immigration in the early years after 1820 was largely from England and Ireland, the British Isles supplying two-thirds of the immigrants for several years. The Irish immigration increased rapidly, and in 1825 and the few years immediately following was about one-half of the whole foreign addition to the population. German immigration in large numbers began in 1832, and from that time Germany has furnished a large part—frequently a third and sometimes nearly a half—of the yearly number of new residents. The Irish immigration in 1832 was also large. The years 1838–39 showed a decline in immigration, probably caused by the financial crisis of 1837 in this country. A return of comparative prosperity here, the famine in Ireland in 1846–47, and political disturbances in Russia and other parts of Europe, led to a gradual but great increase in immigration, which continued with hardly a backward step for fifteen years, until the number of alien passengers reached in 1854 a total of 427,833 persons, a number which was not equalled for nearly twenty years afterwards.

While the causes which have led to the increase and decrease in immigration at successive periods are not always exactly ascertainable, the most important influences can be determined by noticing the conditions of the countries to which and from which the migrations are made. Religious or political persecutions, famine, general business depression, the imposition of unusually heavy taxes, and the requirement of extra military duty are powerful inducements to emigration, while prosperous business conditions and popular governmental acts encourage the residents of a country to remain at home. On the other hand the condition of the country which is the destination of the intending emigrants is no less a factor in determining their number. When there is no threat of war and no unjust oppression is to be feared, when business is active and wages are high, the favorable circumstances are quickly known in countries less happily situated. Former immigrants, finding plenty of profitable employment, send accounts of their prosperity to their friends at home, and frequently assist them to enjoy the same advantages in new homes. An unfavorable condition of business affairs, or public disturbances in the intended home of the alien purposing a change of residence, will often suffice to keep him in his native country. The causes thus noted have had effects that can often be traced in examining the course of American immigration.

The tide of immigration, nearly at its height in 1854, began to ebb in the succeeding years under the combined influences of an improved condition of affairs in Ireland, which had been relieved by emigration from an apparent overplus of population, the discovery of gold in Australia, and the war with Russia. The panic of 1857 had a still greater influence in reducing the number of immigrants, so that in 1858–59 the number was only a third of that reached in several years previous to 1855. Just as the effect of the financial depression was beginning to pass away came the civil war, which, in the early disturbance of established industries and in the vague terror which rumors of it carried to distant lands, was powerful in preventing immigration. The number of alien passengers fell in 1860 and 1861 to about 89,000 a year—less than at any other time after 1844. The Irish immigration was resumed in large numbers in 1863, when the inflation of the currency and the demand for labor in many kinds of business made a period of temporary prosperity.

The immigration from Germany, if it felt less quickly the effect of renewed business activity, resumed in 1865 the first place in numbers, which it has since held. The number of English immigrants also rapidly increased. Sweden, which had previously given only a small number of permanent residents to the United States, sent over large numbers in 1868 and the five succeeding years. The effect of the Franco-German war was shown in a decreased emigration from Germany in 1870 and 1871, while in 1872 and 1873 the French, usually a home-loving race, but then despairing at the misfortunes of their country, gave almost their only important contribution to the crowd of newcomers.

By 1873 the number of aliens seeking new homes in this land had again reached a number over 400,000 in a year, but the financial panic of that year quickly affected the flow of immigration. The succeeding years of business depression continued to affect the numbers of the incoming population until in 1877 the point was reached from which a reaction began. The increase was rapid and was remarkable in the large number of nations which felt the inspiration of the influences tending to augment emigration. Hungary, Bohemia, Russia, and, in an especial degree, the Scandinavian countries, suddenly increased the numbers of their emigrants in 1880. Local influences, such as the Eastern troubles affecting several of the nations and an unpopular government in Denmark, added to the hopefulness as to business prospects in this country, were influential in causing these changes. The religious persecution to which the Hebrew population in Russia were subjected was also an important influence in increasing emigration. The year 1882 brought a larger number of immigrants to the United States than had arrived in any preceding year; the total reaching 730,349. The immigration since 1882 has decreased under the influence of continued business depression.

The total number of immigrants who, up to the middle of the year 1884, had arrived in this country since the foundation of the republic—estimating 250,000 arrivals in the period preceding 1820—is about 13,000,000.

The following table shows the number of immigrants from the principal foreign countries since 1820, as far as the official figures are a correct guide. Before 1856 the reports from the collectors of the various ports furnished only the number of alien passengers, which included some transient visitors. Between 1856 and 1868 a deduction was made in the totals of the number of alien passengers, not immigrants, but all alien passengers were included in the returns of the arrivals from specified countries. The figures in the columns under the names of particular countries in those years in the following table will not be accurate, while the totals will be more exact. A deduction of nearly 2 per cent. should be made from the number of alien passengers, to estimate the number of immigrants. Since 1868 the immigrants have been separately counted. The number of immigrants who arrive by railroads from British America is not reported, but the number is probably not large. The totals of the British Isles in the table on page 386, besides including natives of Wales, contain the only enumeration of a large number of Irish and Scotch who previous to 1871 were not fully recorded separately.

Not only have the United States welcomed to their shores the throngs of aliens seeking homes in this country, but their safety and health while on the voyage hither, their protection from imposition upon landing, and their care in sickness or distress until they had a fair opportunity to become self-supporting, have all been subjects of State or national legislation. The act of Congress, approved March 2, 1819, provided, that if the master of any vessel should take on board or transport between the United States and any foreign port a greater number of passengers than 2 for every 5 tons of measurement, he should forfeit $150 for each passenger above that number. Children under 1 year of age were not counted, and 2 children under 8 years of age were counted as 1 passenger. The vessel itself was forfeited if the number of passengers in excess of that allowed by law amounted to 20. The law also required that an allowance should be made for a voyage between this country and Europe of at least 60 gallons of water, 100 pounds of salted provisions, 1 gallon of vinegar, and 100 pounds of wholesome ship-bread for each passenger, and a proportionate amount for a shorter or longer voyage. In case the passengers were put on short allowance at any time, a payment of $3 a day for each passenger for every day of the restricted allowance must be made. Ship captains were required to make under oath lists of passengers arriving on their vessels, designating in each list the age, sex, occupation, and nationality of each passenger, and setting forth the number of deaths on the voyage.

The national legislature hoped in this way to do away with the evils which had existed in the overcrowding of vessels and in the insufficient provision that was made for the sustenance of immigrants on the long voyages made in slow sailing vessels. The substitution of steam for sails, and the influence of competition between the various lines of steamers, have been, perhaps, as powerful as legislation in the suppression of many of the evils to which immigrants were formerly subjected. Congress has continued to enact laws which, under the general name of "passenger acts," form an important part of national legislation.

Several of these laws were enacted in 1847 and 1848. One, approved Feb. 22, 1847, provided, that the space allotted to each passenger should not be less than fourteen superficial feet on the lower deck, if the vessel was not to pass within the tropics. If it was to pass within the tropics, twenty superficial feet were to be allowed to each passenger, or thirty feet on an "orlop" deck. A year later, legislation compelled the proper ventilation of passenger vessels and the victualling of them so that each passenger might have on his voyage, if needful, 15 pounds of good navy-bread, 10 pounds of rice, 10 pounds of oatmeal, 10 pounds of wheat flour, 10 pounds of potatoes, 1 pint of vinegar, 60 gallons of fresh water, and 10 pounds of salted pork; which was considered provision for 10 weeks. The space allowed to each passenger was increased, and regulations made respecting cleanliness and good discipline.

The provisions of previous laws were partly superseded by the elaborate act of 1855, which after providing that only 1 passenger shall be carried for every 2 tons of vessel, fixes the space that shall be appropriated to each passenger at not less than 16 superficial feet on the main or poop decks, or in the deck houses, and 18 superficial feet on the lower deck—no passenger to be carried on any other deck, nor where the height or distance between the decks is less than 6 feet. A hospital must be provided, berths constructed of sufficient width, and not occupied by more than 2 passengers. Ventilation must be secured by the erection of wooden houses or booby-hatches. Each vessel must have a sufficiently large cooking range, and an ample supply of provisions—nearly as fixed by the law of 1855—must be placed on board. Discipline and cleanliness must be maintained. The captains of vessels who shall fail to furnish sufficient well-cooked provisions shall be subject to a fine of not more than $1000, and imprisonment for not more than one year. Money penalties may be collected for other violations of the act. A payment of $10 must be made for each death on board during the voyage. Vessels are subject to inspection and examination, and lists of passengers, with designations of age, sex, occupation, nationality, etc., must be delivered on the arrival of the vessel.

This act forms the basis of the provisions in the U. S. Revised Statutes, and in the later passenger act of 1882, which contains additional provisions for the separation of passengers of different sexes and of passengers from the members of the crew, and for exercise on the upper deck by immigrant passengers. Other legislation, providing for the inspection of steam and other passenger vessels, has been directed mainly to preserving the lives of the passengers, by regula-

Immigration to the United States.

		England.	Ireland.	Scotland.	Total British Isles.	Germany (including Prussia)	Sweden and Norway.	France.	Switzerland.	Italy.	Spain and Portugal.	Netherlands.	British America.	Total.
Years ending September 30.	1820..	1,782	3,614	268	6,024	968	3	371	31	25	174	49	209	8,385
	1821..	3,073	1,518	293	4,728	383	12	370	93	62	209	56	184	9,127
	1822..	856	2,267	198	3,488	148	10	351	110	32	180	51	204	6,911
	1823..	851	1,908	180	3,008	183	1	460	47	32	244	19	167	6,354
	1824..	713	2,345	257	3,609	230	9	377	253	41	372	40	155	7,912
	1825..	1,002	4,888	113	6,983	450	4	515	166	58	286	37	314	10,199
	1826..	1,459	5,408	230	7,727	511	16	545	245	50	452	176	223	10,837
	1827..	2,521	9,766	460	13,952	432	13	1,280	297	35	421	245	165	18,875
	1828..	2,735	12,488	1,041	17,840	1,851	10	2,843	1,592	30	223	263	267	27,382
	1829..	2,149	7,415	111	10,574	597	13	582	314	16	211	169	409	22,520
	1830..	733	2,721	29	3,874	1,976	3	1,174	109	8	24	22	189	23,322
	1831..	251	5,772	226	8,247	2,413	13	2,038	63	28	37	175	176	22,633
	*1832..	944	12,436	158	17,767	10,194	313	5,361	129	2	111	205	608	60,482
Calendar Years.	1833..	2,966	8,648	1,921	13,564	6,988	16	4,682	634	1,693	1,149	39	1,194	58,640
	1834..	1,129	24,474	110	34,964	17,686	42	2,989	1,389	103	161	87	1,020	65,365
	1835..	468	20,927	63	29,897	8,311	31	2,696	548	56	212	124	1,193	45,374
	1836..	420	30,578	106	43,684	20,707	57	4,443	445	107	209	301	2,814	76,242
	1837..	896	28,508	14	40,726	23,740	290	5,074	383	36	264	312	1,279	79,340
	1838..	157	12,645	48	18,065	11,683	60	3,675	123	82	226	27	1,476	38 914
	1839..	62	23,963	..	34,234	21,028	324	7,198	607	76	447	85	1,926	68,069
	1840..	318	29,430	21	42,043	29,704	55	7,419	500	28	148	57	1,938	84,066
	1841..	147	37,772	35	53,960	15,291	195	5,006	751	166	222	214	1,816	80,289
	1842..	1,743	51,342	24	73,347	20,370	553	4,504	483	93	137	330	2,078	104,565
	†1843..	3,517	19,670	41	28,100	14,441	1,748	3,346	553	108	177	330	1,502	52,496
Years ending Sept. 30.	1844..	1,357	33,490	23	47,843	20,731	1,311	3,155	839	79	286	184	2,711	78,615
	1845..	1,710	44,821	368	64,031	34,355	928	7,663	471	63	318	791	3,195	114,371
	1846..	2,854	51,752	305	73,932	57,561	1,916	10,583	698	88	75	979	3,855	154,416
	1847..	3,476	105,536	337	128,838	74,281	1,307	20,040	192	160	163	2,631	3,827	234,968
	1848..	4,455	112,934	659	148,093	58,465	903	7,743	319	219	231	918	6.473	226,527
	1849..	6,036	159,398	1,060	214,530	60,235	3,473	5,841	13	208	355	1,190	6,890	297,024
	‡1850..	6,797	164,004	860	215,089	78,896	1,569	9,381	325	406	795	684	9,376	369,980
	1851..	5,306	221,213	966	272,740	72,482	2,424	20,126	427	447	485	352	7,438	379,466
	1852..	30,007	159,548	8,148	200,247	145,918	4,103	6,763	2,788	351	459	1,719	6,352	371,603
	1853..	28,867	162,649	6,006	200,225	141,946	3,364	10,770	2,748	555	1,186	600	5,424	368,645
	1854..	48,901	101,606	4,605	160,253	215,009	3,531	13,317	7,953	1,263	1,505	1,534	6,891	427.833
	1855..	38,871	49,627	5,275	97,199	71,918	821	6,044	4,433	1,052	1,156	2,588	7,761	200,877
	1856..	25,904	54,349	3,297	99,007	71,028	1,157	7,246	1,780	1.365	914	1,395	6,493	195,857
	1857..	27,804	54,361	4,182	112,840	91,781	1,712	2,397	2,080	1,007	806	1,775	5,670	246,945
	1858..	14,638	26,873	1,946	55,829	45,310	2,430	3,155	1,056	1,240	1,459	185	4,603	119,501
	1859..	13,826	35,216	2,293	61,379	40,784	1,091	2,579	833	932	1,329	290	4,163	118,616
	1860..	13,001	48,637	1,613	78,374	54,491	298	3,961	913	1,019	1,054	351	4,514	150,237
	1861..	8,970	23,797	767	43,472	31,661	616	2,326	1,007	811	495	283	2,069	89,724
	1862..	10,947	23,351	657	47,990	27,529	892	3,142	643	566	420	432	3,275	89,007
	1863..	24,065	55,916	1,940	122,798	33,162	1,627	1,838	690	547	586	416	3,464	174,524
	1864..	26,096	63,523	3,476	116,951	57,276	2,249	3,128	1,396	600	1,157	708	3,636	193,195
	1865..	15,038	29,772	3,037	112,237	83,424	6,109	3,583	2,889	924	1,057	779	21,586	247,453
	1866..	3,559	36,690	1,038	131,614	115,892	12,633	6,855	3,823	1,382	1,062	1,716	32,150	314,917
	1867..	36,972	72,879	7,582	125,520	133,426	7,055	5,237	4,168	1,624	1,030	2,223	23.378	310,965
	1868..	11,107	42,747	1,949	107,583	123,070	20,420	3,936	3,261	1,406	1,061	652	10,894	289,145
	1869..	55,046	51,290	12,415	147,716	124,788	41,833	4,118	3,488	2,182	1,377	1,360	30,921	385,287
	1870..	59,488	56,628	11,820	151,089	91,779	24,365	3,586	2,474	2,940	802	970	53,340	356,303
	1871..	61,174	61,463	12,135	143,937	107,201	22,966	5,780	2,824	2,940	677	1,122	39,929	346,938
	1872..	72,810	69,761	14,565	157,905	155,595	24,993	13,782	4,031	7,321	928	2,006	40,288	437,750
	1873..	69,600	75,848	13,008	159,355	133,141	39,458	10,813	3,223	7,507	520	4,640	29,508	422,545
	1874..	43,396	47,688	8,765	100,422	56,927	10,917	8,741	2,436	5,867	623	1,533	30,596	260,814
	1875..	30,040	29,969	5,739	66,179	36,565	10,496	8,607	1,641	3,344	1,741	1,073	23,420	191,231
	1876..	21,051	16,506	4,383	42,243	31,323	11,235	6,723	1,572	2,979	1,413	709	21,218	157,440
	1877..	18,122	13,791	3,408	35,554	27,417	9,107	5,127	1,612	3,659	1,094	572	22,121	130,502
	1878.	19,581	17,113	3,700	40,706	31,958	11,392	4,668	2,051	5,391	1,080	652	30,102	153,207
	1879..	40,997	27,651	8,728	78,424	43,531	26,147	4,121	3,834	9,041	1,110	1,199	53,267	250,565
	1880..	64,190	84,709	14,495	164,438	134,040	69,777	4,939	8,498	12,781	581	3,730	139,761	593,703
	1881..	76,547	70,909	16,451	165,230	249,572	82,859	5,653	11,628	20,101	11,687	10,812	95,188	720,045
	1882..	70,893	72,937	15,957	161,428	232,269	87,610	5,560	11,839	29,349	11,928	7,880	86,909	730,349
	1883..	61,432	83,654	10,839	157,361	184,389	53,891	4,016	11,433	29,512	12,083	4,926	66,950	570,316
	1884..	53,270	58,589	8,791	121,756	155,529	37,923	3,690	8,215	14,441	520	3,731	47,888	461,346
	§1885..	45,385	49,356	10,163	104,904	106,910	31,591	3,135	5,126	15,689	……	2,499	……	326,411
		1,304,478	3,093,144	243,693	5,557,686	7,054,850	684,090	341,167	141,535	196,325	73,894	78,202	1,029,000	13,247,462

* And last quarter of 1831.

† First three quarters.

‡ And last quarter of 1849.

(The remaining years are calendar years.)

§ The figures for 1885 are from a preliminary report of the Bureau of Statistics and comprise about 95 per cent. of the immigration for that year.

tions as to fire appliances, life-preservers, and the testing of boilers, engines, and hulls.

The division between the duties and powers of the national government and those of the State governments has always been clearly marked. The right of regulating the carriage of alien passengers, up to the time of their landing, has been within the scope of national legislation, but as soon as they had landed their protection became a matter of State concern. The State of New York had, as early as 1788, a law by which the masters of vessels were required, within 24 hours of their arrival, to report to the mayor or recorder the names and occupations of every person brought into port on their vessels, under a penalty of £20 for each person, or £30 for each foreigner not reported. The law further provided, "That if any master of any ship or other vessel shall bring or land within this State any person who cannot give a good account of himself or herself to the mayor or recorder of the said city for the time being, as aforesaid, or who is likely to be a charge to the said city, such master shall within one month carry or send the person so imported by him back again to the place from whence he or she came." Similar provisions were made in some of the other States. The principal burden of the care and protection of immigrants has fallen upon the State of New York. Three-fourths of the emigrants from countries other than British America arrive at the port of New York. Over 8,000,000 alien passengers have been received at that port in the thirty-nine years since 1847. In the **six** years, 1880–85, the number of alien passengers arriving at New York was:

1880	327,371	1883	405,909
1881	455,681	1884	330,030
1882	476,086	1885	273,594

The proportionate importance of the various ports at which immigrants are received may be seen from the following table of the number who arrived in the several districts in 1884:

Districts.	Immigrants.	Districts.	Immigrants.
Aroostook, Me.	191	New Bedford, Mass.	503
Baltimore, Md.	30,740	Newburyport, Mass.	3
Boston and Charlestown, Mass.	31,491	New Haven, Conn.	9
Buffalo Creek, N. Y.	842	New Orleans, La.	2,954
Cape Vincent, N. Y.	167	New York, N. Y.	322,781
Chicago, Ill.	42	Oswego, N. Y.	17
Corpus Christi, Tex.	1	Passamaquoddy, Me.	1,499
Cuyahoga, Ohio	20	Pearl River, Miss.	28
Detroit, Mich	22,594	Pensacola, Fla.	24
Duluth, Minn	240	Philadelphia, Pa.	19,064
Fairfield, Conn.	2	Portland and Falmouth, Me.	1,539
Galveston, Tex.	962	Providence, R. I.	2
Gloucester, Mass.	145	Salem and Beverly, Mass	3
Huron, Mich.	20,418	San Francisco, Cal.	1,528
Key West, Fla.	1,972	Savannah, Ga.	1
Machias, Me.	1	Superior, Mich.	501
Michigan, Mich.	3	Teche, La.	135
Minnesota, Minn.	924		
Total			461,346

The New York legislature in 1847 passed an act which initiated the system which has since been carried out at New York city for the reception and care of emigrant passengers. Important amendments and additions were made to the provisions of the original law by acts passed in 1848, 1849, 1853, 1855, 1857, 1868, 1881, and 1883. The present system has become so far perfected that the reception of the enormous numbers of alien passengers of the last few years has been accomplished without friction.

When a vessel arrives at New York harbor from a foreign port it is boarded by quarantine officers and by an officer of the Commissioners of Emigration. The quarantine regulations must first be complied with. The emigration officer then examines as to the cleanliness of the vessel and receives a report of the number of steerage passengers, the record of births or deaths on the voyage, and the particulars of any cases of sickness, and receives complaints from the steerage passengers if any are dissatisfied. The master of the vessel is required to make a sworn report of the name, place of birth, last legal residence, age, and occupation of each alien passenger. The report must also specify whether any of the passengers are lunatic, idiotic, deaf, dumb, blind, infirm, maimed, above the age of 60 years, under the age of 13 years, or a widow having a family, or a woman with a family and without a husband. The names of those who have died on the voyage must also be reported.

The immigrants, after their baggage has been examined, are transferred to the landing-depot, which the Commissioners of Emigration are required to designate. This landing-place has for 30 years been at Castle Garden. A fortification known as Castle Clinton had been erected at that place, and was used in 1814 during the war of 1812. The reception of the Marquis de Lafayette at Castle Garden in 1824, and the use of the great enclosure for the concerts of Jenny Lind in 1850, connect the place with two of the important local celebrations of New York city. The main structure now in use is enclosed by the walls of the old castle. The landing-place is well situated, and the buildings, though now old, are well adapted to their uses. The waters of the harbor partly encircle the garden, and there are many wharves at which lie at times scores of barges laden with incoming or outgoing foreigners. The large building will accommodate 3000 immigrants, and in the great rotunda provision is made, under the supervision of the commissioners, for enabling the immigrants to obtain all the articles necessary for subsistence without leaving the building, and with no danger of extortion.

Immigrants who have friends may await them at the Information Bureau. Those who wish to remain for a time in New York city may make arrangements with licensed boarding-house keepers, who are admitted to the building on agreeing to furnish board and lodging on terms approved by the commissioners. Those who wish to go immediately to some other part of the United States may procure tickets from representatives of the several railroads without leaving the building, and they and their baggage are conveyed without extra charge to the railway-stations. Interpreters are provided, who can speak and write every European language; brokers, whose responsibility is approved by the commissioners, exchange foreign money for that of the United States.

Immigrants who are sick are received at a hospital at Castle Garden, and are transferred to the emigrant institutions on Ward's Island, where from 2000 to 4000 persons are under treatment each year. The Commissioners of Emigration have established at Castle Garden a free labor-bureau for immigrants who desire employment, and the German and Irish emigrant societies now pay the expenses of the bureau. In 1884 the bureau procured employment for 23,687 immigrants, of whom 8385 were females. The female immigrants were for the most part engaged for domestic service. The males, to the number of 11,768, found employment as laborers, and over 3000 in skilled occupations.

The rotunda at Castle Garden presents a curious scene after the arrival of one or more large emigrant vessels. In various parts of the room are groups of foreigners, many of them dressed in the costumes of their native countries, gesticulating earnestly, and talking excitedly in their various languages. Many families are among them, with children in the quaint apparel, perhaps, of Italy or of Switzerland. Sometimes, on a wintry day, when the large room is cold and damp, a group of Arabs or of natives of India gather about the stove, shivering even under heavy cloaks that are lent to them, their own loose robes being ill-adapted to the climate, and their stockingless feet half frozen in touching the cold soil instead of the warm sands of the desert. Or, on a sultry day, Russians may swelter under the fur costume suited for their own wintry climate.

The throngs of immigrants are now so safely watched over by the officers appointed by the State and nation that complaints of ill-treatment on the voyage or of swindling after their arrival are rare. The relief of immigrants who were incapable of their own support was formerly continued by New York State for five years after the arrival of the immigrant. The Commissioners of Emigration in 1882 strongly recommended a reduction of this period to one year, saying in their report, "This long period of provisional support tends to encourage pauperism, and to increase the number in the almshouses and charitable institutions of New York by many immigrants who first settled in other States. A recent census shows that nearly one-half of the inmates of this department applied for aid and care after having been in this country one year or more, while nearly one-fourth came from or have resided in other States." On these representations the legislature reduced the period for which the State assumed the care of sick and destitute immigrants to one year from the time of arrival.

The Commissioners of Emigration of New York are nine in number, six being appointed by the governor and confirmed by the senate. The mayor of the city of New York, the president of the German society, and the president of the Irish Emigrant society are also members of the commission, though the representatives of the societies have restricted powers as to the appointment of employés. A change in the law, providing for three commissioners, has not been carried into effect, owing to differences between the governor and the senate as to the selection of a commissioner. Laws somewhat similar to those in New York exist in Massachusetts and other States.

The payment of the expense of caring for and protecting alien passengers intending to reside in the United States has usually been made at New York directly by the owners or consignees of the vessels on which they arrived, though the cost has indirectly fallen probably on the passengers themselves in the increased charge for transportation. The New York city authorities were permitted from the formation of the State to demand a bond from the master of a vessel that the alien passengers brought by him would not be a charge upon the county. The bond might be compounded for under the early statutes, and in 1830 it was provided by law that a commutation might be made by the payment of a sum of money for each passenger. The act establishing the Emigrant Commission in New York in 1847 provided for a bond of $300 from the captain, owner, or consignee of an immigrant vessel to indemnify the cities, counties, and towns of this State for the support of any immigrant who became a public charge within five years of his arrival, or, in place of such a bond, a tax for each immigrant was to be paid. This tax, or "head-money," which varied between $1.50 and $2.50, amounted at New York from 1847 to 1876 to $11,229,329.46.

The payment of this tax was finally resisted by the steamship companies, and in 1876 the New York law was declared unconstitutional, as encroaching on the prerogative of Congress to legislate concerning commerce.

No tax was collected from the steamship companies from 1876 to 1882. A new law, called an inspection law, but imposing a tax of $1 for each alien passenger, was also declared unconstitutional. Suits were begun by the steamship companies for the recovery of the amount paid as "head-money," but these suits were finally dismissed. A law permitting the Commissioners of Emigration to close Castle Garden and the emigrant hospitals to such steamship companies as did not pay for the privilege and levy a fee for each alien passenger led to a dispute which convinced the steamship companies that the privileges of the landing-depot would be cheaply purchased at the fee imposed. They voluntarily paid a fee of 50 cents for each alien passenger, and soon after, in 1882, Congress passed a law which put an end to the troubles in New York as well as in other States about the collection of "head-money."

This law, which has been sustained by a decision of the U. S. supreme court, provides for the payment of 50 cents for each alien passenger by the owner or master of the vessel in which he arrives. The money thus collected forms an immigrant fund, to be used by the secretary of the treasury, who may contract with a State board, or officer designated by the governor, in each seaboard or lake State, for the relief and protection of immigrants, the expense being paid out of the immigrant fund. The amount thus collected from the steamship companies has generally been sufficient to pay the expenses of the State commissioners.

The immigrants, who come from countries widely separated, who are protected on their way to this country by the national laws, and are guarded on their arrival and relieved in distress or sickness by State officers, are distributed in various proportions among the States of the Union. No statistics of the place of birth of the inhabitants of the United States were gathered at any national census before 1850, and no approximate estimate can be made of the number of inhabitants of foreign birth, or the distribution of the foreign-born population, before that time. At the various enumerations since and including 1850 the number of foreign-born inhabitants have been as follows:

Year.	Total population.	Persons of foreign-birth.	Per cent. of foreign-born.
1850	23,191,876	2,244,602	9.68
1860	31,443,321	4,138,697	13.16
1870	38,558,371	5,567,229	14.44
1880	50,155,783	6,679,943	13.32

The several nationalities, as reported in the census of 1880, were represented as follows:

Country of birth.	Foreign-born population.	Per cent. of foreign-born population.	Per cent. of total population.
England and Wales	745,978	11.17	1.49
Ireland	1,854,571	27.76	3.70
Scotland	170,136	2.55	0.34
Germany	1,966,742	29.44	3.92
France	106,971	1.60	0.21
British America	717,157	10.74	1.43
Sweden, Norway, and Denmark	440,262	6.59	0.88
Other foreign countries	678,126	10.15	1.35

The following table shows how the principal elements of the foreign-born population have changed in proportion to the total foreign-born population at various enumerations:

Place of birth.	Per cent. of foreign-born population.			
	1850.	1860.	1870.	1880.
Ireland	42.85	38.93	33.33	27.76
Germany	26.01	30.83	30.37	29.44
England and Wales	13.75	11.54	11.24	11.17
British America	6.58	6.04	8.86	10.74
Sweden, Norway, and Denmark	0.80	1.75	4.34	6.59

The following table shows the total native and foreign-born population in each of the States in 1880, and the ratio per cent., except where that is less than 1 :

States and Territories.	Native.	Foreign-born.	Per cent.
Alabama	1,252,771	9,734	
Arizona	24,391	16,049	66
Arkansas	792,175	10,850	1
California	571,820	292,874	51
Colorado	154,537	39,790	26
Connecticut	492,708	129,992	26
Dakota	83,382	51,795	62
Delaware	137,140	9,468	7
District of Columbia	160,502	17,122	11
Florida	259,584	9,909	4
Georgia	1,531,616	10,564	
Idaho	22,636	9,974	44
Illinois	2,494,295	583,576	24
Indiana	1,834,123	144,178	8
Iowa	1,362,965	261,650	19
Kansas	886,010	110,086	14
Kentucky	1,589,173	59,517	4
Louisiana	885,800	54,146	6
Maine	590,053	58,883	10
Maryland	852,137	82,806	10
Massachusetts	1,339,594	443,491	33
Michigan	1,248,429	388,508	31
Minnesota	513,097	267,676	52
Mississippi	1,122,388	9,209	
Missouri	1,956,802	211,578	11
Montana	27,638	11,521	42
Nebraska	354,988	97,414	27
Nevada	36,613	25,653	70
New Hampshire	300,697	46,294	15
New Jersey	909,416	221,700	24
New Mexico	111,514	8,051	7
New York	3,871,492	1,211,379	31
North Carolina	1,396,008	3,742	
Ohio	2,803,119	394,943	14
Oregon	144,265	30,503	21
Pennsylvania	3,695,062	587,829	16
Rhode Island	202,538	73,993	36
South Carolina	987,891	7,686	
Tennessee	1,525,657	16,702	1
Texas	1,477,133	114,616	8
Utah	99,969	43,994	44
Vermont	291,327	40,959	14
Virginia	1,497,869	14,696	
Washington	59,313	15,803	27
West Virginia	600,192	18,265	3
Wisconsin	910,072	405,425	45
Wyoming	14,939	5,850	39

No State or Territory has a larger foreign-born than native population. The Southern States, except Florida, Louisiana, and Texas, have practically no foreign-born population. The proportion of foreign-born to native population decreased in the ten years between 1870 and 1880, except in Dakota, Oregon, Michigan, and Washington, where the agricultural lands have attracted settlers; Colorado and New Mexico, where the mining industry has greatly developed; New Hampshire, Rhode Island, and Massachusetts, where factories have been established in large numbers; and in Florida and Arkansas, where a beginning has been made in attracting immigrants to the Southern States.

The sixteen States which have over 100,000 foreign-born residents contain natives of the principal countries, as shown in the following table, Scandinavia standing for Sweden, Norway, and Denmark :

States.	Ireland.	Germany.	England and Wales.	British America.	Scandinavia.
California	62,962	42,532	26,577	18,889	9,722
Connecticut	20,638	15,627	15,860	16,444	2,682
Illinois	117,343	235,786	60,012	34,043	65,414
Indiana	25,741	80,756	12,020	5,569	3,886
Iowa	44,061	88,268	25,550	21,097	46,046
Kansas	14,993	28,034	16,260	12,536	14,402
Massachusetts	226,700	16,872	48,136	119,229	5,971
Michigan	43,413	89,085	44,032	148,866	16,445
Minnesota	25,942	66,592	9,598	29,631	107,768
Missouri	48,898	106,800	17,564	8,685	4,517
New Jersey	93,079	64,935	32,148	3,536	3,115
New York	499,445	355,913	123,585	84,182	16,494
Ohio	78,927	192,597	55,318	16,146	2,006
Pennsylvania	236,505	168,426	109,549	12,376	8,901
Texas	8,103	35,347	6,749	2,472	2,662
Wisconsin	41,907	184,328	30,268	28,965	66,284

There is a large British American population in Maine, New Hampshire, and Vermont, besides that in the States mentioned in the table, and the Scandinavians have large settlements in Dakota and Nebraska. About two-thirds of the Mexicans in the United States are to be found in Texas, and three-fourths of all the Chinese are in California.

A computation by the Census Bureau indicates that if a line were drawn north and south through Pittsburg, one-third of the Germans and two-thirds of the Irish residents would be eastward of the line, and two-thirds of the Germans and one-third of the Irish to the westward. The Swiss are mainly found in Ohio, New York, Illinois, Pennsylvania, Wisconsin, Missouri, California, and Iowa. A large majority of the Russians are in Kansas, New York, and Dakota. The Bohemians are most numerous in Wisconsin, Illinois, and Iowa, and the Poles in New York. One-third of the Belgians are found in Wisconsin, and more than half the Portuguese in California. The Austrians are widely scattered. Nearly a third of the French are in New York and Ohio, and one-half of the remainder are in Louisiana, California, Illinois, Pennsylvania, Missouri, and Indiana. The Chinese abound in the Pacific States and Territories. The Hollanders are most numerous in Michigan—which has nearly one-third of the number of that nationality—New York, Wisconsin, Illinois, and Iowa.

The immigrants of almost every nationality have been received with favor here, and the policy of the government has been to foster immigration. There have been slight restrictions on immigration in other cases, but the laws respecting the importation of Chinese laborers form the only important exception to the general rule. The inhabitants of China had been, up to thirty years ago, so averse to leave their native land that Chinese immigration had scarcely been a factor in the development of the population. The total number of natives of China reported as having arrived in the United States before 1851 was 46. In 1854 the number of arrivals of this race increased from 42 in the previous year to over 13,000. The yearly immigration of the Chinese has since been—

Year.	Chinese Immigrants.	Year.	Chinese Immigrants.
1854	13,100	1870	11,943
1855	3,526	1871	6,030
1856	4,733	1872	10,642
1857	5,944	1873	18,154
1858	5,128	1874	16,651
1859	3,457	1875	19,033
1860	5,467	1876	16,879
1861	7,518	1877	10,379
1862	3,633	1878	8,468
1863	7,214	1879	9,189
1864	2,975	1880	7,011
1865	2,942	1881	20,711
1866	2,385	1882	35,614
1867	3,863	1883	381
1868	10,684	1884	84
1869	14,902		

The increasing number of Chinese laborers who came into the United States excited fear and aroused opposition on the Pacific coast, where almost all of these immigrants had landed and settled. The system under which a limited servitude was kept up by the contractors who imported Chinese laborers was distasteful to the community.

Some of the objections to the Chinese as permanent residents of this country were stated by Justice Field of the United States Supreme Court in a judicial opinion delivered in California in September, 1882. He said: "It was discovered that the physical characteristics and habits of the Chinese prevented their assimilation with our people. Conflicts between them and our people, disturbing to the peace of the country, followed as a matter of course, and were of frequent occurrence. Chinese laborers, including in that designation not merely those engaged in manual labor but those skilled in some art or trade, in a special manner interfered with the industries and business of this State. Their frugal habits, the absence of families, their ability to live in narrow quarters without apparent injury to health, their contentment with small gains and the simplest fare gave them great advantages in the struggle with our laborers and mechanics, who always and properly seek something more from their labors than sufficient for a bare livelihood, and must have and should have something for the comforts of a home and the education of their children. A restriction upon the immigration of such laborers was therefore felt throughout this State to be necessary if we would prevent the degradation of labor and preserve all the benefits of our civilization."

Other objections to the presence of the Chinese on the Pacific coast were offered. Allegations of unhealthful, vicious, and corrupting practices were freely made. Public feeling was aroused, and many attacks on them by street boys and men occurred in San Francisco and other cities. Restrictive measures were adopted by the city authorities designed to prevent the Chinese from carrying on freely their usual avocations. Some of these measures were oppressive enough to be rebuked by the local courts. A wide difference of opinion existed in various parts of the country as to the justness of some of the complaints, and the necessity of forbidding the further importation of Chinese laborers.

A committee of the U. S. Senate and House of Representatives investigated the subject in 1876 and 1877, and made a report recommending legislation to restrain the incoming of Asiatic populations. The Chinese government had never greatly favored the emigration of its subjects, and little difficulty in modifying the treaty with China was experienced in 1880, when in response to the urgent appeals from the inhabitants of the Pacific coast an effort was made to limit the immigration of Chinese laborers. The Burlingame Treaty of 1868 had provided for free emigration and immigration, but the modified treaty permitted the limitation or suspension by the United States government of the coming or residence in the United States of Chinese laborers, but the absolute prohibition of such immigration was forbidden.

After excited discussion Congress passed in 1882 a bill suspending for twenty years the coming into the United States of Chinese laborers. The bill was vetoed by President Arthur, but a modified act fixing the limit of suspension at ten years became a law. The Chinese who had already become residents of the country were not disturbed, and those who wished to make visits to China with the intention of returning hither were furnished with passports. The suspension of immigration related only to laborers, a term which has been construed to include skilled workmen. The results hoped for from the law by its advocates have for the most part been accomplished already. The open immigration of natives of China has practically ceased, the number reported as arriving in 1884 being 84. Statements are made that large numbers of Chinese laborers land on the Pacific coast at ports in British North America and make their way across the border into the United States. The number of such immigrants is, however, probably not large, and the number of Chinese returning to their own country greatly exceeds the number of reported arrivals. The Chinese population is probably declining, as there are almost no Chinese families here.

The value of the Chinese as immigrants has been a disputed matter. In the Pacific States, where they abound, their presence has certainly proved a disturbing element, and in some places the inhabitants have resorted to violence to drive them out, while in many Eastern cities they form an industrious, useful, and law-abiding portion of the community.

Immigrants who have met with even more general disfavor than the Chinese are the members of the pauper and criminal classes. Laws to restrain the immigration of such persons have been framed in almost every State at which an alien could enter the United States. The enforcement of these laws has not always been easy. Some European governments have favored the policy of deportation to America as a means of getting rid of criminals. This custom prevailed in Switzerland a few years ago, and it was only on representations of the strongest character by our government that the practice was abandoned.

The English law has for many years recognized assisted emigration as a mode of relief under the Poor Laws of that country. The Poor Law Commissioners have charge of the fund which is raised annually from the poor rates. In times of unusual distress Parliament has voted large amounts to assist emigration, especially among the Irish peasantry. The purpose of these acts is not criticised, but it has been found in practice that in some districts the local authorities have chosen old, decrepit, or helpless persons, who were likely soon to become public charges, as emigrants, and have paid their passage to the United States, expecting thus to save the expense of their maintenance. In 1883, when a large sum was appropriated to assist Irish emigration, the New York Commissioners of Emigration found that many of the emigrants were unable to support themselves even if employment was given to them. Affidavits of many of the emigrants showed that they belonged to the pauper class. Three hundred of such emigrants arrived on one vessel in the summer of 1883. Many of them were returned to the country from which they came by the steamship companies. The importation of criminals and paupers is guarded against so carefully that no organized immigration of persons of those classes has been successful, though many individuals who are incapable or criminal doubtless find a refuge here.

The sect of Mormons, or Latter-Day Saints, has been greatly strengthened by immigration. Missionaries are sent to England, Wales, Norway, Denmark, and other countries to obtain converts to the Mormon faith. These missionaries, working with peculiar zeal, are successful, especially among the most ignorant portions of the community in the north of England and in the Scandinavian countries. No record of Mormon immigration has been kept for a series of years, but estimates have been made that 30,000 of the sect had arrived in this country before 1860, and 25,000 in the succeeding fifteen years. This immigration has been somewhat discouraged by the vigorous efforts of the United States government to suppress polygamy among the Mormons and by the loss of energetic leaders.

The value of immigration as a factor in the development of the United States has been a subject of much discussion, and varied opinions exist. That there is a substantial addition from this source is an undoubted fact. Friedrich Kapp, formerly a Commissioner of Emigration at New York, calculated that on an average each emigrant brought $100 in money and $50 in other property, and these items alone would aggregate in wealth brought into the country since the formation of the republic nearly $2,000,000,000, or more than the present national debt. Other estimates of the amount of property brought by immigrants are not as large as that of Mr. Kapp. The New York Commissioners of Emigration in 1856 asked each immigrant on his arrival as to the amount of money which he had with him, and the average made up from the answers to these inquiries was $68.08. From Mr. Kapp's own inquiries it appeared, however, that in many cases the immigrants, supposing that the questions might be asked for purposes of taxation or oppression, did not give true answers, but kept large sums of money concealed. Dr. Young, of the Bureau of Statistics, places the probable value of the property of the average immigrant at $80.

Each immigrant, however, adds to the wealth of the country not only the property which he brings with him but the value of his own productive power, and this factor, while the most important one in estimating the results of immigration, is also the most difficult to ascertain. Commissioner Kapp, by a computation based partly on the prices of slaves and partly on German estimates as to the cost of rearing German laborers, fixed the average value of the immigrant at $1125. Dr. Young's estimate is about $800. At the lower estimate, the immigrants who have arrived in the United States in the past century have brought in themselves an increase of wealth of over $10,000,000,000.

Such computations, while interesting, are not at all conclusive. A single immigrant of inventive skill or great powers of mind may bring to the country where he makes his home a power that may aid incalculably in the development of its resources. On the other hand, as Edward Self points out in some thoughtful articles in the *North American Review*, the effect of immigration in importing persons who become paupers or criminals, or who leave offspring who become criminals, has not been sufficiently considered.

Of the inmates of the almshouses in 1880 44,106 were natives and 22,961 were foreign-born. The percentage of paupers to inhabitants among natives was 0.10 and among foreign-born 0.34. The native paupers and criminals according to statistics in several States include a large proportion of persons whose parents were born aliens. The persons confined in prisons in 1880 numbered 59,255, of whom 46,338 were natives and 12,917 were of foreign birth. The percentage of foreign-born criminals to foreign-born population is larger than that of native criminals to the native population.

These results might naturally be expected when it is remembered that vicious persons may often be compelled to leave their native countries for causes which are not sufficiently serious to demand extradition. The crowding of masses of foreigners into the tenement houses of the great cities is one of the principal agencies in promoting crime in the immediate descendants of immigrants. The cities, and especially New York city, are peculiarly affected by these evil influences. The New York Commissioners of Emigration, in their report for the year 1882, say, "The largest and most vigorous and valuable part of immigration merely passes through New York to those parts of our country where cheap and fertile lands and comfortable homes may be obtained, while the less valuable portion remains in the city of New York, unable from want of means to go farther, or, attracted by the fascinations of a great city, attempt a fortune among the vicissitudes of a populous metropolis."

The beneficial effects, however, of the immigration, which alone has rendered the rapid development of the United States possible, are still further beyond estimate. Every kind of skilled and unskilled labor has been introduced to add to the productive power of the country. The records of the Bureau of Statistics show that in the years from 1873 to 1883 the principal occupations of the immigrants were:

Professional.	
Actors	953
Artists	1,725
Clergymen	3,957
Lawyers	856
Musicians	4,815
Professional.	
Physicians	1,747
Teachers	3,616
Skilled.	
Bakers	13,830
Blacksmiths	21,009
Skilled.	
Butchers	12,779
Carpenters	63,406
Clerks	23,875
Engineers	8,958
Mariners	16,893
Masons	28,424
Mechanics (not specified)	21,312
Miners	45,288
Skilled.	
Painters	8,531
Shoemakers	22,174
Tailors	20,990
Weavers	11,150
Miscellaneous.	
Farmers	350,847
Laborers	943,581
Merchants	67,937
Servants	152,777

The totals, including many other occupations, are:

Professional occupations	25,343
Skilled occupations	455,949
Miscellaneous occupations	1,588,246
Occupations not stated	81,223
Without occupations	1,997,019
Total immigration	4,147,780

The laborers of every class are scattered throughout the land. The Lake States of the North-west have no population more industrious and more efficient in agricultural pursuits than the Scandinavians, who form a large proportion of the community. Much of the railroad building, which has been a chief instrument in developing the country, would have been impossible but for the labor of immigrants, who endure drudgery that the natives of this country are unable or unwilling to undergo. The quick invention and adaptability of the Irish, the economy and industry of the Germans, the sturdy qualities of the Scandinavian character, and the varied excellencies of the other component parts of our vast foreign-born population have been of incalculable advantage. Without the added population and wealth which immigration has brought the growth of the country would have been slow indeed.

The bibliography of American immigration deserves only the briefest mention. The reports of the U. S. Bureau of Statistics contain the figures which form the basis of all the calculations on this subject. Dr. Edward Young, of that Bureau, compiled a useful pamphlet on *Immigration* (1871). Friedrich Kapp's thoughtful discussion of the subject is in the published transactions of the American Social Science Association. Dr. Schade has written on *Immigration since* 1790, and W. J. Bromwell has collected many of the statistics in a *History of Immigration to the United States*. There are several magazine articles on the subject, of which those of Dr. Jarvis in the *Atlantic Monthly* and Mr. Self in the *North American Review* are noteworthy. An article on Immigration in Vol. I. of the Tenth Census gives valuable statistics and deductions. The Annual Reports of the New York Commissioners of Emigration frequently contain valuable information on special topics relating to immigration, as well as full and accurate statistics of the work of the commission.

(J. P. D.)

See Vol. XII. p. 755 Am. ed. (p. 717 Edin. ed.).

IMPEACHMENT. The Constitution of the United States provides that the President, Vice-President, and all civil officers of the United States shall be removed from office for and on conviction of treason, bribery, or other high crimes or misdemeanors (Art. 2, § 4). The House of Representatives has the sole power of impeachment (Art. 1, § 2), but the Senate tries the charges, and no conviction can take place without the concurrence of two-thirds of the members present. The chief-justice must preside on the trial of the President. Judgment in case of conviction cannot extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted is nevertheless liable and subject to indictment, trial, judgment, and punishment according to law. Provisions similar to these are incorporated in the constitutions of the several States. Under these provisions several questions of importance have arisen in case of impeachments by the Federal House of Representatives, of which the following are most important:

1. Who is to be deemed a civil officer within the

meaning of the clause first quoted from the Constitution? This question would only be raised in regard to the members of the legislative department of the government. Executive and judicial officers are unquestionably included in the term civil officers as here used; but whether members of the two Houses of Congress are also included has always been matter of dispute. In 1797 William Blount, a senator from Tennessee, was impeached by the House of Representatives for alleged participation in a conspiracy to transfer New Orleans from Spain to Great Britain by the aid of military and naval forces, but his counsel pleaded to the jurisdiction that the office of senator was not such a civil office as was intended by the Constitution, and also that he had been expelled by the Senate, and was therefore no longer an officer, and no longer subject to the process whether so before or not. The Senate sustained the plea, but without distinctly placing its decision on either ground, so that no question of law was settled by the decision.

2. The second question, Whether by ceasing to be an officer the party accused ceased to be amenable to this process, was raised again in the case of William W. Belknap, who, in 1876, was impeached by the House for a corrupt use of his power of appointment as secretary of the war department. A few hours before the impeachment the secretary resigned, and his resignation was accepted by the President. When the impeachment came on for trial it was contended on his behalf that as he was only a private citizen when impeached the process failed for want of jurisdiction, but the Senate decided by a vote of 37 to 29 that an accused party could not thus evade a trial, and that the liability concerned the status at the time of the offence alleged, and not at the time of the accusation. Unfortunately this vote, though it determined that the cause should proceed, was nevertheless conclusive against conviction, since the senators who held to want of jurisdiction, and who constituted more than a third of the body, must on the same ground vote on the final submission against conviction; and the final result was that the accused was acquitted for want of jurisdiction, though the plea to the jurisdiction had been overruled. It can hardly be said under these circumstances that the question of jurisdiction for such cases has been authoritatively determined.

3. A further very important question is, What, within the intent of the Constitution, are such high crimes and misdemeanors as are impeachable? A subordinate question is, whether the terms crimes and misdemeanors are used in the Constitution in their ordinary legal sense—a sense which would exclude any case not punishable by law, if the accused was a private person—or in some broader and more general sense. If employed in their legal sense, the scope of impeachment is restricted on the one side, but not on the other; for the descriptive words are accompanied by a qualifying term, which, while it implies an exclusion of some crimes and misdemeanors, does not by specification exclude any, and as a consequence the impeaching body and the trial court must determine upon the special facts of particular cases, whether they are or are not within the constitutional intent. But there is scarcely room for reasonable doubt that the descriptive terms in the Constitution were employed in a popular rather than in the legal sense. Many acts may constitute misdemeanors in an officer unfitting him for his position, which in a private citizen would be only breaches of good morals or of decency. The case of Judge Pickering, the district judge for the federal district of New Hampshire, will furnish an illustration. He was impeached in 1803 on charges the chief of which were drunkenness and profanity on the bench, and was convicted and removed from office. The charges, if sustained, were of such a nature as made his further continuance in office a great public evil, and the power of impeachment would be very seriously defective if it did not embrace such a case. But the constitutional provision was necessarily left vague and very much at large in view of the absolute impossibility of specifying by enumeration or description in advance the infinite variety of ways in which public officers may so conduct themselves as to render their further continuance in office a public scandal or a public danger. This would be particularly true in the case of officers whose duties are political, who would generally escape punishment if it were necessary to define impeachable offences in advance as in the case of ordinary criminal laws.

Few cases of impeachment of federal officers have so far occurred. Three have been mentioned: the others are the following: In 1804 Judge Samuel Chase, of the federal Supreme Court, was impeached on charges of arbitrary and overbearing conduct on the trial of certain political cases, of improperly urging certain indictments upon the grand-jury, and of indulging in highly indecent and extra-judicial reflections before another grand-jury upon the government of the United States, then administered by Mr. Jefferson. Judge Chase had been a signer of the Declaration of Independence, and was a very able judge; but he was also a very ardent Federalist, and like most judges of the day took liberties in his judicial action, and especially in his charges to grand-juries, which at this time would be regarded as highly improper and wholly out of place. But the party feeling of the day ran so high that it was impossible to convict him: the trial took on a party character, and the Federal senators, who constituted more than a third of the body, voted for acquittal.

In 1830 Judge Peck, the federal district judge for the district of Missouri, was impeached for arbitrary and illegal conduct in punishing a member of the bar as for contempt of court for a severe criticism in a newspaper of one of his judicial opinions. He was not convicted, a small majority of the Senate voting in his favor. On the breaking out of the civil war in 1861 Judge Humphreys, the federal district judge for the district of Tennessee, repudiated his allegiance to the United States and accepted a commission from the Confederacy, and for this was impeached, convicted, and removed from office, making no defence.

The most important trial of impeachment was that of Pres. Johnson in 1868. The charges were eleven in number, but only three were voted upon. Two of these were based upon alleged violations of the tenure-of-office law, in an attempted removal of Secretary Stanton from the department of war and the substitution of Lorenzo Thomas in his place. The other was founded on language made use of by him in a public speech, in which Congress was characterized as a Congress of only a part of the States, and not a constitutional Congress, with intent, as was charged, of denying that its legislation was obligatory upon him, or that it had any power to propose amendments to the Constitution. The trial of this case also to some extent assumed a party character, the Republican party having strongly condemned the action complained of, while the Democratic party approved; but seven of the Republican Senators refused to vote for conviction, and an acquittal followed, on a vote of 35 guilty to 19 not guilty. A question of importance on the trial was, whether the president *pro tem.* of the Senate, who in the event of conviction would become President, had a right to vote; but he claimed and exercised the right.

It is apparent from the foregoing statement that the power of impeachment has been used very sparingly in the national system, and has resulted in conviction in those cases only in respect to which there could be no fair ground for dissent. Impeachment has been a rare proceeding in State government, and none of the cases which have arisen is sufficiently important to be specially mentioned here. (T. M. C.)

IMPUTATION, in theology, is the gracious grant of Christ's righteousness to believers, by which God accepts them as holy. This imputation is conditioned on faith, and involves the impartation of the Holy Spirit with the new sanctified nature in the believer. Man has thus, through faith, the righteousness of God and not his own (Rom. x. 3), but made his own, on which his holy character, life, and destiny are built. There is also an imputation of man's sins to Christ, who bears them and becomes a curse under them (Gal. iii. 13; 2 Cor. v. 21; 1 Pet. ii. 24). These two imputations are possible because of the Word becoming flesh (John i. 14). Christ entered fully into humanity and the believer and Christ are thus identified. (See John vi. 56 and xvii. 23.) (H. CR.)

INCARNATION, in theology, is the appearance of the Deity upon the earth in animate form. The heathen nations believed that their gods appeared as beasts or as men at different times. Jupiter appeared to Europa as a bull. Apollo served Admetus as a man-slave. Probably every heathen nation believed that a divine being could, when he pleased, adopt a visible form, but it is certain that they did not regard the god as assuming an animal or human nature in such appearance. It was a mere metamorphosis, not a change of nature. Here the Christian idea of incarnation differs altogether from the heathen notion. Christ was God incarnate, not merely as a theophany but as a human being. The Word became flesh. The Divine and human were united in him. The appearances of God to Abraham were theophanies, but the Christ of Bethlehem was a real babe; Jesus of Nazareth was a real youth, a real man, although the Son of God. How the human and the Divine were united in Christ has been a speculative problem causing great contests in the church. Some have denied the human, like the Docetæ, the Patripassians, and the Eutychians, and others have denied the Divine, like the Arians. The various theories that unite the human and Divine are very numerous, some emphasizing the human and some the Divine, while still others recognize a single theanthropic condition as constituting the union. (For details, see article JESUS CHRIST in the ENCYCLOPÆDIA BRITANNICA.) (H. CR.)

INDEPENDENCE, DECLARATION OF AMERICAN. The instrument known by this name, the adoption of which on the 4th of July, 1776, has made that day memorable as the birthday of a nation, was but the formal, diplomatic publication of what had been a virtual fact for several months. While it is undoubtedly true that the great body of the people of the thirteen colonies entered into the contest with the mother country with no purpose of separation, it is equally certain that John Adams, from the outbreak of hostilities in 1775, and Samuel Adams, from a still earlier period, looked forward to independence. Washington and other army officers were unequivocally committed in favor of it as early as the beginning of 1776, about which time Thomas Paine's pamphlet, *Common Sense*, was widely diffusing this sentiment among the people. As early as in November, 1775, the Congress had recommended to the people of New Hampshire, South Carolina, and Virginia to establish governments suited to their condition. North Carolina followed their example, and in May, 1776, the Congress voted that each one of the united colonies, where no government sufficient to the exigencies of their affairs had as yet been established, should adopt such government as would in the opinion of the representatives of the people best conduce to the happiness and safety of their constituents in particular and of America in general. The preamble to this resolution, after reciting the act of Parliament which purported to exclude the Americans from the protection of the crown, the king's neglect to answer their petition, and the employment of "the whole force of the kingdom, aided by foreign mercenaries, for the destruction of the good people of these colonies," declared that it was "absolutely irreconcilable with reason and good conscience for the people of these colonies now to take the oaths necessary for the support of any government under the crown of Great Britain, and that it was necessary that the exercise of every kind of authority under the crown should be totally suppressed, and all the powers of government exerted under the authority of the people of the colonies." This was a virtual assertion of independence. The vote was not unanimous, but it committed the Congress and the most important of the colonies—Pennsylvania excepted—to that full extent. Other acts had implied as much. In March, 1776, privateers were authorized to cruise against British ships, and in April the commerce of the thirteen colonies was thrown open to all the world not subject to the king of Great Britain. The only difference between these measures and that which was consummated on the 4th of July is that they were provisional, while the Declaration proclaimed a final and irrevocable act.

The provincial congress of North Carolina on April 12 unanimously "empowered their delegates in the Continental Congress to concur with the delegates of the other colonies in declaring independency and forming foreign alliances." On May 4 the general assembly of Rhode Island discharged the inhabitants of that colony from all allegiance to the king of Great Britain, and authorized its delegates in Congress to join in treating with any prince, state, or potentate for the security of the colonies, and directed them to favor the most proper measures for confirming the strictest union. The Virginia convention, on May 15, unanimously resolved that they had "no alternative but an abject submission or a total separation," and therefore voted "that their delegates in Congress be instructed to propose to that body to declare the united colonies free and independent States, absolved from all allegiance or dependence upon the crown or Parliament of Great Britain; and that they give the assent of this colony to such declaration and to measures for forming foreign alliances and a confederation of the colonies." In accordance with these instructions, on June 7, Richard Henry Lee, in the name of Virginia, proposed in Congress, "That these united colonies are, and of right ought to be, free and independent States; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved; that it is expedient forthwith to take the most effectual measures for forming foreign alliances; and that a plan of confederation be prepared, and transmitted to the respective colonies for their consideration and adoption." The resolution was seconded by John Adams. On the following day the debate was begun, and continued two days with great earnestness on both sides. It appeared that a majority of colonies was for independence, but a postponement of the question for three weeks was agreed to in order, if possible, to secure unanimity. To save time a committee consisting of Jefferson, Adams, Franklin, Roger Sherman, and Robert R. Livingston was appointed to prepare a declaration. In the meantime, on June 14, Connecticut instructed her delegates in favor of independence, foreign alliances, and a permanent union of the colonies; and on the same day the Delaware assembly abolished the royal government and authorized her delegates to vote for independence. The question on Lee's resolution came to a vote in Congress on July 2, and delegates from twelve colonies (New York being unable to vote) unanimously declared that "these united colonies are, and of right ought to be, free and independent States." "The 2d of July, 1776," John Adams wrote, "will be the most memorable epocha in the history of America; to be celebrated by succeeding generations as the great anniversary festival, commemorated as the day of deliverance . . . from one end of the continent to the other, from this time forward for evermore." But as the Declaration was not reported and adopted until the 4th, the anniversary of independence was fixed upon that day. The Declaration was drawn up by Jefferson, who was deficient in power as a debater, but was a master in the use of the pen. His draft was adopted with a few slight amendments suggested by his colleagues of the committee. The only considerable change was the striking out of an eloquent denunciation of the slave-trade, and of Great Britain for forcing the traffic on the colonies. Unhappily it was but too clear that the colonies were not unanimous on this subject. The declaration was adopted and authenticated by the signatures of the president and the secretary of the Congress, was published, and was proclaimed at the head of the army. On the 2d of August the members of Congress signed the declaration, which had been engrossed on parchment. The body was somewhat changed since the 4th of July by the retirement of members and the election of successors. The changes made the body unanimous. It was in a season of gloom and anxiety that the young nation threw down the gage of defiance to the most puissant empire then in the world, and more than five years of conflict and endurance were required to translate the bold word into accomplished fact. For upward of half a century "Independence Day" was celebrated with national enthusiasm, and the public reading of the Declaration of Independence was an essential part of the celebration. Then came the period of self-criticism. Our history, our achievements, our institutions, it seemed, had perhaps been too enthusiastically magnified. Fourth-of-July oratory was another name for bombast. Rufus Choate allowed himself to indulge in something like a sneer at the "glittering generalities" of the Declaration. At length our government was submitted to the crucial test of a titanic civil war, and now again our institutions are a subject of pride and rejoicing. Again, the Fourth of July and the Declaration of Independence have their honors, and they will not improbably recover the enthusiastic recognition they enjoyed "sixty years since."

The facts concerning the Declaration are given in sufficient detail by Bancroft, *History of the United States*. In Jefferson's *Works* will be found a fac-simile of his draft, with the corrections of the committee. Fuller details of the measure are exhibited in the *Lives* of John and Samuel Adams and Jefferson. (L. E. S.)

INDIA, or the East Indies. Under this general term are comprehended the two great peninsulas of Hindostan and Farther India, or, as it is now usually styled, Indo-China, as well as the East India or Sunda Islands. The western peninsula, that of Hindostan, to which the name of India is often restricted, is by far the more important, better known, and more populous, but has already been fully treated in the Encyclopædia Britannica. Some recent facts are here noted.

Since the first mention of India in history it has had a teeming population, but the division of the peninsula into numerous states, regarding each other as a foreign power, and constantly at war with each other, kept the population within the bounds of production until the ascendancy of British power practically welded the whole into one empire.

Since that date the increase of population has been immense, and, as improvements in agriculture, the reclamation of waste lands, and the growth of manufactures have not kept pace with that of population, periodical famines occur, taxing to the utmost the resources of the entire country. There are districts so thickly peopled that, though they bear two crops annually, this is not sufficient to save the people from starvation.

In the endeavor to remedy this evil to some extent, the Indian government has caused the execution of a vast series of irrigation works—undoubtedly the most remarkable and extensive that have been constructed in modern times. India has always been a land of irrigation. The plains of Northern India, away from the foot-hills of the Himalaya, and the tableland of Southern India, would without irrigation support but a sparse population, and the former rulers, Brahminical, Buddhist, and Mohammedan alike, perpetuated their power by the erection of dams and tanks to supply the fields of their subjects with water. Many of these works had with the lapse of time and the disappearance of dynasties fallen into ruin or disuse, and their complete restoration would have been insufficient for the needs of agriculture. The execution of these great works has doubtless somewhat alleviated the condition of the people, but population seems to increase beyond the limits of any effort that can be made by government, and the people have as yet not learned to emigrate to any appreciable extent.

The population and area of Hindostan at the present time may be set down approximately as follows:

	Sq. miles.	Population.
Ajmeer, Berar, and Coorg	22,005	3,480,000
Assam	46,341	5,100,000
Bengal	193,198	72,800,000
Bombay Presidency	124,122	16,800,000
Central provinces	84,445	10,300,000
North-west provinces and Oude	106,111	45,000,000
Madras	141,001	31,200,000
Punjab	106,632	20,000,000
Hyderabad (native)	81,807	10,200,000
Rajputana (native)	129,750	10,700,000
Mysore, Travancore, Baroda	116,463	19,400,000
Tributary States, etc. (native)	143,529	13,700,000
French and Portuguese possessions	1,491	800,000
Himalayan States	90,350	3,300,000
Ceylon	24,700	2,890,000
	1,411,745	265,670,000

Out of this vast population more than 50,000,000 are Mohammedans, and Islamism is continually on the increase at the expense of Brahminism, which is still the prevailing faith.

During the last twenty-five years a special state department has administered the Indian forests. The need of conservators educated in forestry soon became apparent, and in 1866 an arrangement was made by which candidates were trained in forestry in France. In 1878 a central forest school was established to prepare natives of India for the executive charge of forest ranges. The total area of the forests of British India was computed in 1883 at 75,270 square miles, of which about 48,000 have been acquired by the forest department. These forests owe their escape from destruction to their inaccessibility or the unsuitability of the ground for irrigation. Many of them are upon the Himalayas up to heights of 8000 to 9000 feet. A survey is in progress on a scale of 4 inches to the mile.

The trigonometrical survey of Hindostan, the last chain of the principal triangulation of which was completed in 1882, was probably the greatest of modern surveys. A project for the general triangulation of Southern India was drawn up by Major Lambton. In 1818 the survey had reached the northern limits of the Madras Presidency, and was transferred to the supreme government. Lambton was succeeded by Everest, who devised a system of meridional chains of triangulation about 1° apart, tied together by longitudinal chains about 5° apart. Upon this system the work has been completed. The completion of these lines rendered it necessary to penetrate forest and jungle, and great sacrifice of life often resulted. The mortality suffered during the carrying of the longitudinal series of triangles across the Terai, a deadly malarial region at the foot of the Nepalese Himalayas, was greater than that of many a famous battle.

Indo-China. *Geography.*—The peninsula of Farther India was until recently one of the least known parts of the world, and cannot even now, great as have been the additions to our knowledge of it, be said to be thoroughly explored. The geography of the country is such as to render exploration difficult, and to favor the division of the peninsula into a number of small kingdoms, which are separated by almost impassable mountains. From the mountain-mass of Yunnan, which may be regarded as an eastward prolongation of the Himalayan system, descend several ranges of mountains, dividing the peninsula into a series of great north and south valleys, each watered by a mighty river. These great rivers are, proceeding from west to east, the Irawadi, Salween, Meinam, Mekong, and Songka or Red River of Tonquin. There are many other rivers of less importance, but these are the main arteries.

The source of the Irawadi is unknown, and its upper course, though it may be marked upon maps, is unexplored. About its head-waters lies a mountainous country, inhabited by tribes which, though claimed as a portion of Burmah, are not under the control of any regular government. Throughout its lower course it is the river of Burmah, and it finally forms an extensive delta upon the western side of the Bay of Martaban. The Salween flows through the Shan states, and across the British possessions on the eastern shore of the Bay of Bengal, finally entering the sea at Moulmein. The Mekong descends to the China Sea by a circuitous course through the Shan states, those of the Lao Shans tributary to Siam, Cambodia, and French Cochin-China. The last two of these rivers are believed to rise in the mountains of Eastern Thibet, and it is believed by some that the Irawadi has its origin in the same region. The Meinam runs a comparatively short course, watering the fertile land of Siam, and entering the bay of that name a little below Bangkok. The Songka enters the Bay of Tonquin far to the north and east of the Mekong, and east of the mountains which separate Anam from the Laos states. It rises somewhere among the mountains of Yunnan and thus cannot compare in length of course with the Salween or Mekong. The Donnai, Saigon, and other smaller but more or less navigable rivers form a second fluvial system in French Cochin-China. The Sittang, which flows into the head of the Bay of Martaban, has a course almost as long as that of the Meinam. The tide rushes up its mouth in a great bore.

The arguments in favor of the rise of the Irawadi far to the north of the limits of Indo-China are briefly as follows: (1) The great volume of the Irawadi, which has an average discharge of 521,794,000,000 cubic yards of water annually, or three-fourths that of the Mississippi, and thus must, to all appearances, need a larger drainage basin than the Salween and Mekong, which bear down a much smaller volume of water. (2) Chinese geographical annals extending over 1200 years, and corroborated by the reports of French missionaries and others, by Chinese maps, and by the local names of the rivers, all go to prove that the Sanpo of Thibet is the upper course of the Irawadi, and not that of the Brahmaputra as is usually supposed. (3) The watershed of the Brahmaputra, without that of the Sanpo, is sufficiently extensive to account for the volume of that river. Against these arguments can be arrayed the fact that there does not appear to be, from the conformation of the country, any possibility for the Sanpo to make its way around the Brahmaputra to the Irawadi.

The frontier between Indo-China and China proper is by no means well defined, and the districts along that frontier are almost unknown to Europeans.

Peoples and History.—The ruling peoples of Indo-China appear to consist for the most part of the descendants of successive hordes of Chinese who, at various dates, have spread southward from the over-populated parts of Southern China, or have fled their country from political reasons. These semi-Chinese races, who for the most part are considerably behind the Chinese in culture and the arts of civilization, are superimposed upon an older population inhabiting the mountains, forests, and jungles, and maintaining themselves more or less independent. Around the coasts and in the peninsula of Malacca the Malay race predominates. Hindostan gave to the peninsula its prevailing creed of Buddhism, and the now tottering kingdom of Cambodia or Khmer was largely tinctured with Hindu civilization, as evidenced in the architecture of its famous ruined temples, which are in the bounds of the present kingdom of Siam.

The modern Chinese are now spreading throughout much of the peninsula. They are almost dominant in Siam, they are making their way from Yunnan along the Mekong Valley, they swarm in Tonquin under the black and yellow flag, and they are numerous in Malacca and Singapore.

Previous to the irruption of the more or less sinicised races of Southern China Indo-China seems to have been peopled by aborigines of the same stock as those which inhabited the former region. Among these were the Trao, now represented by a people of the same name in Cochin-China, who are among the smallest of men; by the Mincopies of the Andaman Islands, the Simangs of Malacca, and one or two communities within the bounds of the Chinese Empire. This race was, in fact, Negrito. Another tattoed race known to the early Chinese was that of Tchang Rioh, or long-legged people, whose descendants are probably to be met with in the Mois of Cochin-China, the Phnongs, and the Khas.

The predominant race, however, from the region around the great bend of the Yellow River, southward over Southern China and Indo-China, at the date of the appearance of the more cultured Chinese from the west, was that known as Mon, Ngu, or Man. These people were also called by the Chinese the Great Bowmen or Y. They tattoed, cropped their hair, and were good potters. Though, in the course of time, overpowered by the culture and finally by the administrative power of the Chinese, and also mixed with Chinese blood to a considerable extent, the Mon appear to have been an important ingredient of the race of the Shans, or, as they call themselves, Tai, which has from time to time poured down upon Indo-China. Other intrusive races beside the Chinese were the Tek or Teh, and the Tok or Tchou. These finally gave a dynasty to the Chinese, and also founded a rival great kingdom in the south, known as Teru or Tsv. The Tek seem to have had some connection with Turkish hordes, and were to some extent the ancestors of the Karens.

The Chinese Emperor Yaou, who came to the throne B. C. 2356, sent the tribe of Hi to take the government of the country south of the Yang-tse. From this period forward the Chinese emperor, whether of Chinese race or not, claimed suzerainty over the districts to the south of the Yang-tse, and though the claim seems for the most part to have been unaccompanied with any real power, the Chinese colonists prepared the way for unification. The great state of Teru remained the rival of the empire until B. C. 224. Every political change seems to have forced southwards a portion of the nations of Southern China, each successive immigration more imbued with Chinese customs and blood than the one which preceded it. The Karens seem to have been the earliest immigrants from Southern China. For a long period the Karen kingdom of Lin-y Youe-chang, or Lam-ap, blocked the path of the invading Yun Shans, and the Mau Shans by treachery put an end to a Karen kingdom west of the Salween. Three bodies of Shans seem to be distinguishable, viz.: the Yun Shans, Mau Shans, and Laos Shans. The cradle of the Tai, or Shan, seems to have been the Kiu-lung Mountains.

About 543 B. C. the Yun Shans had founded towns to the south of Yunnan, and were pushing down the Mekong to the Karen country. In A. D. 431 they founded cities in the Meinam Valley and overran and occupied the northern part of Cambodia.

Early in the sixth century B. C. the Mau Shans entered the valley of the Irawadi, drove the Burmese southward, by 1220 annexed Assam, and in 1293 became predominant over the Shan states to the east and west of the Salween as far as Zimmé. By the end of the thirteenth century they had shattered the Burmese Empire, driven the Yun Shans southward, attacked Java, Malacca, and Cambodia, annexed part of Pegu, and extended their sway over the Malay

Peninsula as far south as Tavoy. From this time to A. D. 1554 Shan princes were ruling in the valleys of the Irawadi, Sittang, and Salween, as well as in the country south of Yunnan as far east as Cochin-China. The Yun Shans, driven southward by the Mau Shans, founded the kingdom of Siam.

The Laos Shans were settled in the country west of Tonquin at a very early date, and had wedged themselves as far south as Vien-Chang before the arrival of the Yun Shans; these are therefore known to their neighbors as Lau or Lao, which means old.

The kingdom of Vien-Chang was at the height of its power in the fourteenth century, was flourishing in the seventeenth, and did not succumb to the Siamese until 1827.

The Anamese, who have the unenviable reputation of being the ugliest race in Indo-China, seem to have been a mixture of Mau and Chinese, who spread southward from Tonquin, and have been but little intercrossed with the Shans. They are squat, less vigorous than the other races, and are noted for the deformity of the big toe, which sticks out separate from the others.

The Burmese are of Thibetan origin. Their kingdom was contracted by the irruption of the Mau Shans in the sixth century B. C. In the thirteenth century the whole of Burmah except Pegu fell into the hands of the Mau Shans, and notwithstanding the disruption of the Mau Empire was governed by Shans until 1554, when the emperor of Pegu annexed it to his dominions.

Cambodia, or Khmer, is the oldest empire of the peninsula. It is first mentioned in 1109 B. C. In the third century it traded with Rome. It seems to have received its civilization from India, and tradition states that an immigration of Hindus took place B. C. 254. The Karen wave extended into Cambodia, which in the fourth century was ruled by Karen princes. Buddhism was not introduced until A. D. 422, and the Indian dynasty in Cambodia ended in 581 A. D. Since that date the state has gradually declined in extent and importance.

Whatever the older natives of Siam may have been, the term Siam is the equivalent of Shan, and the present Siamese Empire commences with the founding of Ayuthia in 1350. The history of Indo-China is a confused mass of struggles between the more or less distinct races; or rather, the constantly varying political agglomerations which occupied it. These struggles seem to have been more sanguinary and incessant since the rise of the Siamese and Peguan or modern Burmese Empire than they were previously. Burmah, Siam, Cambodia, and Vien-Chang were engaged in constant warfare, during which the Burmese were more than once at Ayuthia, and Siamese power seemed to be broken, only to rise again, and finally to become predominant over a large part of Cambodia, over the Zimmé Shans, who for a while were ruled by Pegu, and over the Laos. The Portuguese annals furnish lively pictures of the wars of the sixteenth century, in which Portugal took part.

Present Condition.—The principal political divisions of Indo-China are Anam, including Tonquin, the original seat of Anamese power, Cochin-China (see Cochin-China in Vol. II.), and French Cochin-China; Cambodia, once the seat of a powerful kingdom, but now under the protection of France; Siam, which occupies a large area with undetermined boundaries in the centre of the peninsula, as well as a portion of its southern prolongation, the peninsula of Malacca; and the British possessions, which may, since the taking of Mandelay, and the deposition of King Theebaw in 1885, be considered to comprehend what has before been known as the Burmese Empire, as well as the districts of Lower Burmah and Tenasserim, and the Straits settlements of Pulo Penang, Wellesley, and Singapore, etc. The northern Shan tribes, once subject to Burmah, are now independent, and many of the hill-tribes, remnants of states which were formerly powerful, still maintain a practical independence. Several small independent Malay states exist in the peninsula of Malacca—as Johore, Selângor, Pahang, Perak, Negri Sembilan, and Sungei Ujong. Those named are all situated in the southern part of the peninsula between 2° and 5° N. lat. The Pahang is one of the largest rivers of Malacca, rising nearer to the western than the eastern coast; it runs north-west into the China Sea. The little state of Perak is famous for its tin-mines, which are to a great extent worked by Chinese. The River Perak runs nearly north and south for about 150 miles, and then turns abruptly westward to the Straits of Malacca.

The population of Indo-China is greater than has been supposed. M. R. du Caillaud estimates that of Tonquin alone at 18,000,000, and it cannot certainly fall short of 15,000,000. Cochin-China proper is less populous, but the valley of the Mekong is densely peopled. The following is as close an approximation to the population of the various states as can well be obtained:

		Sq. miles.	Population.
Anam	Tonquin	63,780	15,000,000
	Cochin China	101,660	6,000,000
	French Cochin China, Cambodia	59,970	3,100,000
Siam, including the Siamese Shans		280,640	7,000,000
Lower Burmah and Tenasserim		87,220	4,050,000
Upper Burmah and Independent tribes		209,600	4,400,000
Singapore and Straits settlements		1,445	470,000
Independent Malacca		31,500	500,000
		835,815	40,520,000

These figures, with the exception of those relating to English and French possessions, are but rough approximations. The interior of Siam is well peopled, and the figures given may be below the truth.

The productions are vast and varied. The mountains abound in metals. Gold is plentiful, and can be found in the basins of all the rivers. The taxes are paid by the princes tributary to Siam in gold; gold is used without stint on the Burmese pagodas, and travellers mention its existence in Tonquin, Siam, Burmah—in whatever part they journeyed. Silver, argentiferous galena, lead, iron, copper, antimony, are known to exist; and tin occurs in Cambodia, and is probably mined in Perak. Upon the plains between Chantabun and Battambong sapphires are found of a quality not inferior to those of Ceylon.

The forests furnish many valuable timbers, including teak. Gutta-percha, pepper, coffee, rice, cotton, sugar-cane, and indigo are among the vegetable products; and the best tea used by the Chinese is grown at Puerh, within the Shan states.

Ivory and silk are among the most important animal products. Most of the mammals of Hindostan are found here, together with others peculiar to the region. The rich valleys and deltas of the Irawadi, Meinam, Mekong, and Song-ka teem with life of every kind, the birds and insects being especially numerous and beautiful.

Siam is the largest political agglomeration of the peninsula. The reigning family are Siamese, but that branch of the Shans is probably inferior in numbers to the other races of the empire. In all the centres of trade, especially in the sea-ports, Chinese are predominant, while the Laos and other Shan princes are only nominally subjected, paying an annual tribute, but ruling their own subjects. The most south-western Laos are those who inhabit the provinces of Pachim and Nayok-nayok, and who were transported thither by the king of Siam after the destruction of Vien-Chang. These Laos are exceedingly indolent, scarcely raising rice enough to maintain themselves. Those nearer Korat are more active, and devote more attention to agriculture, especially to sericulture. Indolence, however, seems to be the curse of both Siamese and Laos, and is causing them to give way, on the one hand, before the "black-bellied" or body-tattooing northern Shans, and on the other before the ever-active and pushing Chinese.

Besides Bang-kok, the Venice of the East, with its floating houses on the Meinam, and a population of perhaps 500,000, Siam contains many other large cities, as Zinmé or Cheng-Mai, an entrepôt of trade between British Burmah and Siam, and the capital cities of the Laos states. The seaport of Chantabun has a population of 30,000.

The power of Burmah has been on the decline of recent times, so that not only the hill-tribes of the north and east, *i. e.*, of the parts bordering on China on the one hand and those west of the Salween on the other, are practically independent, but the once tributary Shan states have become entirely so.

The Burmese are in indolence equal to the Siamese and Laos, and seem certainly inferior in manliness to the northern Shans. They are an exceedingly polished and courteous race, conceited to excess, loquacious and boasting. It must be conceded that in the graces of civilization they are in advance of all other Indo-Chinese. Pegu and the western sea-coast still contains a remnant of the Talains or Mon race, who were probably the aboriginal inhabitants.

The Karens are one of the most interesting races of the peninsula. They include a large number of tribes, principally resident in what was once Burmah, but found also on the other side of the Mekong. The white Karens of Lower Burmah have been for ages overridden and persecuted by the Shans and Burmese, and are an excessively timid race. They have been taken in hand by the American Mission, and have proved specially amenable to Christianity. Colquhoun states that there are 457 Christian Karen churches in British Burmah.

The Karen-nees or Red Karens, so called from their short red breeches, are very different. Kidnappers by profession, their country cannot be passed through by traders, and blocks trade between the Shan states and British Burmah. The Kachyens of the north of Burmah seem to be allied to the Karens. There are a great number of hill-tribes bearing separate names, some of them remains of the former Karen agglomeration, but some, as the Lawas, apparently even of older date. The hill-tribes behind the delta of Tonquin, called by the Anamites Muongs, are Shans. The difficulty of arriving at a clear idea of the distribution of the peoples of Indo-China is enhanced by the fact that each has a different name for the other.

The prevailing religion of the ruling races of the peninsula is Buddhism, but Buddhistic beliefs and practices are strangely mixed up with the original nature-worship of Mongolian peoples. There is also a belief in a Supreme God, called Tie, Bra, and Phya-Then by different peoples. The worship of "nats" or genii is still the sole religion of these hill-tribes, whose residence in the country is older than the introduction of Buddhism.

European Pretences and Possessions.—The valleys of Indo-China have of late years assumed great importance in the eyes of Europeans, not only on account of their own great fertility and capabilities, but as furnishing a high-road into Southern China, by which the productions and manufactures of that country can be brought to the markets of the rest of the world more readily than they now are. The chief claimants to power in the peninsula are the English and the French. The latter hold the delta of the Mekong, and have acquired a protectorate over Cambodia and the whole of Anam; but their hold upon the latter country is rendered insecure, not so much by any hostility of the Anamites, as by the crowds of Chinese smugglers, who, drilled into respectable armies, exploit the country for their own benefit. These bands of Chinese outlaws are suffered to remain unchecked by the Chinese government, partly, perhaps, through feebleness, but chiefly because, without direct expense to the government, they form a very efficient check to foreign aggression in that quarter. The claim made by France for indemnity for losses suffered from the hands of these bands has produced a hostile feeling towards the French on the part of the Chinese. To these political difficulties is added the greater one that the Song-ka, the navigability of which was loudly vaunted, does not prove to be so convenient a road into Yunnan as was believed, since the delta of Tonquin and the valleys of Yunnan are separated by a broad mountain belt, occupied by tribes who have their own wild way in spite of either China or France.

England has held Tenasserim and Arracan since 1826; Lower Burmah and the mouths of the Irawadi since 1852; and, at the end of 1885, in consequence of the arbitrary conduct of King Theebaw, sent an expedition to Mandalay, the result of which was the dethronement and captivity of Theebaw, and the annexation of Burmah to the Empire of India. Burmese power has not in recent years really extended over a large part of the country which figures on the maps as Burmah, the Shans, Karens, and other tribes being really independent, and the authority of the king confined to the Burmese proper, or rather to that portion of them not resident in Lower Burmah, whither a stream of immigration set in the moment it passed into British possession. The knowledge of the character of the tribes inhabiting the country lying between the Lower Irawadi Valley and the frontier of China, coupled with the desire to open up a highway of commerce to that country, has induced England, profiting by the ill-success of the French, to offer to give up a portion of what was nominally Burmah to the Chinese government, provided that government will engage to garrison it and keep it in order. The suzerainty which China has always claimed over Burmah will be acknowledged, provided no tribute is exacted. But much remains to be done before a trade route is really opened between China and India. The upper course of the Irawadi is through mountain defiles, and China can only be reached from Burmah by mountain passes. When at last these difficulties are overcome, when the most practicable route has been surveyed and improved, and the frontiers of China and the British Empire meet, then a crowd of Chinese will flock into Burmah and even Bengal. The fact that they have not already sought an outlet in this direction, while they find their way down the Mekong Valley and into Tonquin, proves the impassable nature of the country. France looks with longing eyes upon the Mekong, the valley of which permitted the entrance of the Shans, yet knows that the river is for the greater part of its length unnavigable, a torrent with numberless rapids; little better than the Salween. (W. N. L.)

INDIANA is the thirty-fifth State in the Union in area, and the sixth in population. The population, according to the census of 1880, was 1,973,301, classified as follows: Males, 1,010,361; females, 967,940; native-born, 1,834,123; foreign-born, 144,178; white, 1,938,798; colored, 39,228; Chinese, 29; civilized Indians, 246. Of the native population, 1,354,563 were born in the State; 186,391 in the State of Ohio, 73,928 in Kentucky, 51,234 in Pennsylvania, 26,506 in New York, 24,538 in Virginia, 27,201 in Illinois, 20,884 in North Carolina, etc. Of the foreign-born, 80,756 were born in Germany, 13,421 in Ireland, 3,716 in England, 3,695 in Switzerland, 1,368 in Holland, 1,397 in Scotland, 3,121 in Sweden, etc.

See Vol. XII. p. 852 Am. ed. (p. 813 Edin. ed.).

Agriculture.—The soil of the State is admirably adapted to agriculture of all kinds possible to the latitude, and the principal industry of the State is that which is derived from the cultivation of the soil. The following table exhibits the farming statistics for the year 1883:

Products.	Number of bushels.	Average yield per acre.	Number of acres.	Price per bush.	Total value of crop.
Corn	95,620,000	27.0	3,541,482	$0.41	$39,204,200
Wheat	28,447,800	10.4	2,735,370	.95	27,025,410
Rye	250,743	9.9	25,258	.65	162,983
Oats	21,304,100	29.7	717,560	.32	6,817,312
Buckwheat	70,784	8.7	8,158	.90	63,706
Barley	340,956	21.6	15,792	.55	187,526
Potatoes	8,471,010	90.0	94,189	.33	2,797,413
Tobacco (lbs.)	8,471,240	714.	11,863	.075	635,343
Hay (tons)	1,876,595	1.46	1,285,339	8.50	15,951,058
			8,485,011		$92,844,951

In 1885 there were planted 3,720,681 acres of corn, producing 131,994,000 bushels; 2,518,455 acres of wheat, 26,659,455 bushels; oats, 1,014,630 acres, 27,178,000 bushels. The average price per acre from Indian corn planted was $38.8, and the total value of the crop, $38,278,260; wheat, $77.1 per acre, total, $22,926,740; oats, $28.5 per acre, total value, $6,794,500. The average crop products for five years, 1878–83, was as follows: corn, 44,451,199 bushels; wheat, 41,596,766; rye, 238,185; oats, 5,121,446; barley, 444,565; tobacco, 424,886 pounds; buckwheat, 84,463 bushels; potatoes, 2,455,536 bushels; hay, 14,189,420 tons. The total average value of the crop was $108,969,968. The following exhibits the live-stock interests of the State as reported in 1884:

Stock.	Number of head.	Average price per head.	Total value.
Horses	593,131	$77.13	$45,748,194
Mules	52,815	85.81	4,532,055
Milch-cows	504,793	35.00	17,667,755
Other cattle	851,355	26.85	22,858,882
Hogs	2,692,652	6.15	16,252,310
Sheep	1,145,084	2.81	3,217,686

The total number of cattle of all kinds was 1,356,148, of which 447,529, or thirty-three per cent., were of high-grade stock.

Manufactures.—The materials and facilities for extensive manufactures in this State are many and great; if the industries have not been so largely developed as in other States, it has been owing largely to the absorbing attention which has been paid to agriculture and other interests. Along the Wabash and its tributaries are dense growths of valuable commercial timbers, such as walnut, ash, poplar, etc., which afford facilities for manufactories in all kinds of wooden wares. The most extensive manufactories are at South Bend, New Albany, Lafayette, Terre Haute, Richmond, and Indianapolis, and the principal branches of manufactures are agricultural implements, carriages and wagons, boots and shoes, railway cars, clothing, flour, furniture, iron, lumber, liquors, machinery, pork-packing, woollen goods, sheet-iron ware, tin, etc. The number of manufacturing establishments in 1880 was 11,193, employing on the average 62,072 males over sixteen years of age, 3,615 females over fifteen years, and 3,821 children and youth. The capital invested in all works was $65,742,962, and the total wages paid during the year was $21,960,888. The total value of the materials was $100,262,917, and the value of all products, $148,006,411.

Minerals.—The State is abundantly underlaid with coal measures of the bituminous kind, including caking coal, the Indiana block coal, which is used extensively in the manufactories, and cannel. The quantity and general distribution of forests have made it unnecessary that a large draught should be made upon the coal deposits for fuel use, consequently the coal measures have not been worked extensively. The annual production of coal of all varieties was 437,870 tons in 1870, 1,000,000 tons in 1877, 1,449,496 tons in 1880, 1,500,000 tons in 1882, and nearly 2,000,000 tons in 1883. The total value of the coal production in 1883 was $3,143,000. Iron ore is found in large quantities and the percentage of metal yielded is large. These ores are of the hematitic kind and are generally used in combination with the specular ores brought from the mines in Missouri and along Lake Superior, the iron produced from this combination of ores being of the first quality. The limestone deposits are of the carboniferous age, and are inexhaustible in quantity. Some of the deposits where quarrying is done are over thirty feet in thickness. The stone with sandstone of the same geologic period is used for building purposes. There is also a deposit of lithographic stone found of good quality. In Lawrence and Martin counties there are beds of porcelain clay, or kaolin. Stone used in burning lime for making hydraulic cement, and white sand for the manufacture of plate glass, are also found extensively. Salt and sulphur springs abound. In 1883 the total value of all the minor minerals and metals was $22,291, and the amount 7,599 tons.

Wealth, Debt, Taxation, etc.—The assessed valuation of the State in 1880 was $727,815,131, of which $538,685,239 was on real estate and $189,131,892 was on personal property. The total taxation for the same year was $10,843,630, of which $2,493,963 was State tax, $4,031,029 was county tax, and $4,318,638 was for districts less than county, requiring a tax of 12 cents on each one hundred dollars of assessed property. The receipts from taxation as indicated by the reports were $1,704,194. The State debt was $4,998,178, of which $3,904,783 is due the common-school fund; this bears 6 per cent. interest, payable semi-annually. The twelve principal cities have a debt of $7,175,758. In the same year there were 15,919 commercial houses in the State, which had a capital, including real estate, personal property, and cash paid in, of $115,365,745. There were 3,191 manufacturing firms, having a capital of $45,397,175, and 4,472 firms of mechanical industries. The number of residence dwellings in the State was 375,225, making an average of 5.27 persons to each dwelling, and the number of families was 391,203, an average of 5.06 to a family. There were 90 national banks in the State in October, 1880, with a capital stock of $12,189,500; surplus fund, $3,031,907.59; undivided profits, $1,478,693.51; circulation, $6,734,150; unpaid dividends, $5,529.39; individual deposits, $19,845,317.11; U. S. deposits, $680,411.34; deposits of disabled U. S. officers, $103,122.26, etc. On Sept. 30, 1884, the condition of the national banks of the State was as follows, the number remaining the same—90:

Loans and discounts	$23,357,584.51
Bonds for circulation	7,516,800.00
Bonds for deposits	1,050,000.00
U. S. bonds on hand	315,350.00
Other stocks and bonds	1,515,020.00
Due from reserve agents	3,450,208.05
Due from national banks	1,768,900.92
Real estate, etc	297,506.35
Fractional currency	13,491.78
Trade dollars	16,299.40
Specie	2,097,272.27
Legal tender notes	1,598,277.00
U. S. certificates of deposit	10,000.00
Due from U. S. treasurer	335,616.42

On Oct. 1, 1885, these banks represented a capital of $12,189,500, with a circulation of $6,734,150, loans and discounts $30,636,484, individual deposits $27,693,720. The number of depositors in savings banks at the same period was 9,402, the amount of the deposits was $2,171,009, making an average of $230.91 to each depositor.

The amount of internal revenue collected for different years was as follows:

1874	$4,823,495.59	1879	$5,851,103.83
1875	4,653,789.05	1880	6,213,636.49
1876	5,519,126.27	1881	7,281,253.48
1877	6,037,220.27	1882	6,485,356.94
1878	5,710,837.56	1883	5,592,719.85

The total amount in 1885 was $4,012,457.02, from various revenue sources as follows: Distilled spirits, $3,484,597.11; tobacco, $179,371.83; fermented liquors, $344,631.17; collections not otherwise provided for, $614.72; penalties for the infraction of revenue laws, $3,242.19.

Transportation.—The State is especially favored in railroads, its position making it necessary for all the trunk lines connecting the East and the West to pass across it. The number of miles of railway built and in operation was 2,117 in 1865. In 1870 there was 3,177 miles; in 1880, 4,020 miles. In 1886 there were about 5,650 miles. The longest canal in the United States, the Wabash and Erie, passes through Indiana a distance of 374 miles; this canal runs from the Maumee River at Toledo, Ohio, to the Ohio River at Evansville, Ind., a distance of 476 miles. Another canal, 75 miles in length, extends from Lawrenceburg to Hayestown. Of the 92 counties in the State all but five have railroads passing through them, and these five border on the Ohio. Telegraph lines exist in all parts of the State and every considerable town and city is connected with telephone. The cash capital of the railroads is about $200,000,000, with a bonded debt of $150,000,000 and other debts of $63,536,273. The total cost of building and equipment was a little less than $300,000,000. On the Ohio River there are 51 steam-vessels belonging to this State, having a tonnage of 7,744 and a value of $399,500; the crews number 588, the capital invested is $445,500 and gross earnings, $664,892; $205,233 was paid for services; the freight traffic amounted to 796,572 tons, and the number of passengers carried aggregated 205,594.

Education.—The State is keenly alive to the importance of the education of its youth, and by no means deserves the unenviable reputation sometimes attached to it on the basis of isolated instances of backwoods illiteracy. The statistics of the latest reports give the number of children of school age, 708,596; the number enrolled in the schools was 498,792, and the average daily attendance, 305,513. The amount expended annually for teachers' salaries was $3,143,529, and the total expense of the schools for the year, $4,793,704. The number of colleges and universities was 15, with 40 instructors in the preparatory departments, 143 in the collegiate; 1,655 students in the preparatory and 1,307 in the collegiate. The income from the productive funds of these institutions was $47,215, from tuition fees, $18,517; there are 86,188 volumes in the libraries, and the total value of all grounds, buildings, and apparatus is $1,220,000. In the public common schools the number of teachers is 13,259, of which 7,274 are male and 5,985 are female. The other schools of the State appear in the following exhibit:

Schools.	Number.	Instructors.	Pupils.	Vols. in libraries.	Value of property.
Normal	10	92	5,978	12,820	
Kindergarten	7	15	165		
Secondary institutions	18	62	2,341	7,000	$77,500
Deaf and dumb	2	34	607	3,006	458,110
Blind	1	24	128	2,070	354,617
Reform	2	10	516	500	
Orphan asylums	19	85	1,117	895	
Sup. instruction of women	2	33	278		30,000
Commercial and business	11	46	2,173	550	
Theology	3	11	65		
Law	2	11	72		
Medicine	5	80	292	400	4,500

Morals, Religion, etc.—The absence of any large cities with the attendant preponderance of immorality, and the large proportion of the citizens who are native-born, have contributed, with some other things, to make the moral tone of the State as a whole very high. It has taken advanced ground on the leading moral and religious questions of the day; no prohibitory legislation of the liquor traffic has yet been passed, but the question has been agitated for a number of years, with a large majority of the citizens favoring it.

The various religious denominations of the country are represented in this State, all in good condition and some flourishing. The principal of these in their relation to each other in the number of organizations, ministers, and membership, is given in the following:

Denomination.	Organizations.	Clergymen.	Members.
Roman Catholic	266	219	170,000 (*a*)
Methodist Episcopal	1,584	505	143,861
Christian	675	580	78,950
Baptist, Regular	558	325	40,950
Lutheran	274	152	33,500
Presbyterian	303	186	28,358
United Brethren	339	317	24,784
Friends	144	232	21,200
Dunkards	120	267	17,500
United Evangelical	47	34	15,305
Protestant Methodist	94	111	7,000
Reformed in U. S.	57	32	6,750
Evangelical Association	108	88	6,225
Cumberland Presbyterian	33	24	3,658
Protestant Episcopal	42	32	3,651
Anti-Mission Baptist	79	65	2,775
Wesleyan Methodist	44	36	2,737
Universalist	46	21	2,653
United Presbyterian	31	19	2,545
Winebrennarian	54	42	1,942
Congregational	36	19	1,809
Methodist Episcopal South	...	21	1,457
Second Advent	12	10	1,200
Free Will Baptist	23	17	943
Moravian	2	3	595
Seventh Day Advent	24	5	522
Jews (whole pop. 2,856)	14	11	378
Unitarian, Congregational	6	4	300
Reformed Presbyterian	4	2	300
Reformed Episcopal	1	2	250
Free Will Methodist	8	21	240
Presbyterian South	2	1	170
Reformed in America (Dutch)	1	1	57
New Mennonites	1	1	150

(*a*) The Catholic estimate includes all who are members of families in any way connected with the church; to bring the membership to the basis of that in the Protestant churches would make the Catholic membership about 100,000.

Historical.—Indiana sent five regiments to the war with Mexico. In the civil war of 1861-65 the State raised and equipped 30,000 men for the first call for three-months troops. O. P. Morton was the war governor of the State. An arsenal was established at the capital and did much to aid the government and preparing war munitions. In the call of Pres. Lincoln for 300,000 men in 1863 the State furnished its full quota. A large body of home-guards, or State militia, was raised independent of the troops furnished for regular service to the general government; the contiguity of the State to that of Kentucky and the raid by the guerilla Morgan through Ohio were the influences which called out these State troops. Though doing no actual service in the war they were a protection to the State, and indirectly aided the war by doing duty which otherwise would have fallen on regular troops. The entire number furnished by the State during the war for government service was 196,363 officers and men.

The State has furnished many men who have been prominent in the affairs of the nation in all of its departments. Thomas A. Hendricks, twice nominated for the vice-presidency on the Democratic ticket, once in 1876 and again in 1884, was elected in the latter year, and died soon after his inauguration. (A. C. M.)

INDIANAPOLIS, a city, capital of Indiana, stands on the west fork of the White River, at the geographical centre of the State, in Marion county, 39° 48′ N. lat. and 86° 6′ W. long. It is nearly equidistant from Chicago and Cincinnati, and occupies an almost level site, 722 feet above tide-level. It is one of the chief railway centres in the United States, no fewer than 15 railways diverging from this city. These railways belong to 11 corporations, some of their lines passing through the city and others terminating in it. Most of the streets cross at right angles, but there are four main avenues radiating from the centre. The city is exceptionally well built, and presents a handsome appearance. Among the noteworthy public buildings are the new State-house, which takes rank as one of the finest buildings of its class in the country; the county court-house, a costly structure; the city-hall; the very large and commodious State insane hospital; asylums for the blind and for deaf-mutes; the prison and reformatory for women; the post-office; the Masonic temple, etc. There are 30 hotels, 5 national and 2 State banks, 9 weekly and 6 daily newspapers, 88 churches, a large public library, and at least 60 schools, public and private.

Indianapolis is the receiving and distributing point for the trade of a large extent of country, and is by far the largest city in the State. Pork-packing is a leading branch of business. There are numerous foundries, mills, and factories, the manufacturing interests being varied and extensive. The city is well lighted and paved, and has water-works and three public parks. The total tax-valuation for 1885 was $53,000,000; the public debt is $1,400,000. The population is largely of American birth, with a considerable element of foreign, chiefly German, origin.

Indianapolis was founded and named in 1821, its site having been selected by the State for the place of the future capital in 1820. At that time the whole region was a dense forest. It became an incorporated town in 1836, and was chartered as a city in 1847. Population in 1860 was 18,113; in 1870, 48,244; and in 1880, 75,075.

INDIAN CORN. See under AGRICULTURE, AMERICAN, Vol. I., p. 106.

See Vol. XII. p. 862 Am. ed. (p. 822 Edin. ed.).

INDIANS, AMERICAN. *Population.* — On account of the uniform testimony of so-called historians, and the settled convictions, at least, of the enemies of Indians that the Indian population of the United States has been constantly decreasing, it is pleasant for their friends and the friends of humanity to discover by actual counts that this testimony, taking in the whole field, is erroneous. Several histories have told us that the remnants of once powerful tribes are very small; that some have disappeared; that should the ratio of decrease continue, there will be few, if any, Indians remaining at the close of the next century; certainly that their total extinction in time is inevitable. It appears taken for granted that the Indian has something in his nature unfitting him to live in contact with civilization.

Plain facts lead us to doubt these statements; that this population is decreasing or ever has decreased on a large scale, from the time of the discovery of America till to day. It is difficult even now among the nomadic tribes to determine their numbers. They are reached only approximately, even upon the reservations, and we know that it was only estimating, and rough estimating at that, which afforded the enumeration of a hundred years ago. Tribes were sundered and scattered; parts were joined to other tribes; many Indian families have been absorbed by the whites; weak tribes have become weaker; but at the same time stronger ones have become stronger, thus giving little actual loss. By a careful study of the census it is noticed that most of the tribes are to-day on the increase. This is confirmed by the reports from the agencies upon the num- Indians, many births are never reported to the agents, while seldom if ever does a death occur without their knowledge. In peace the solemn rites and deep feeling of awe in the presence of death mark that event beyond question; and in war there is usually a careful numbering.

The depleting causes in times past were greater than now. At present there are no wars between the tribes. The conflicts with U. S. troops are very few. In fact the troops are in the field against less than 200 Apaches, and elsewhere there has been substantial peace for the last five years. The old stories of the pestilence which blotted out certain tribes cannot be truthfully repeated, for the Indians now have good medical attendance at hand. Still the probability is that though the death-rate has been diminished by continued peace, good food, and medical attendance, yet in the past it never was so great as represented. Careful writers begin to understand that in the early history there were wonderful exaggerations in the numbers of Indian warriors then existing, where ten Indians have stood for a hundred, and a hundred for a thousand.

There are to-day in the United States, exclusive of Alaska, 264,369 Indians.

Distribution.—The Indians are distributed as follows:

Arizona	21,163	New York	5,007
California	11,409	North Carolina	3,100
Dakota	31,051	Oregon	5,055
Idaho	4,276	Texas	387
Indian Terr.	82,334	Utah	2,699
Iowa	354	Washington Ter.	10,996
Kansas	976	Wisconsin	7,838
Michigan	9,577	Wyoming	1,855
Minnesota	5,287	Florida and Indian Terr. (Seminoles)	892
Montana	14,775		
Nebraska	3,602		
Nevada	8,316	Maine (Old Town Indians)	410
New Mexico	30,003		

The above numbers are grouped on 68 reservations. Each reservation is under the charge of an Indian agent who receives his appointment from the President. He lives at the agency. The reservation buildings usually comprise blacksmith-shop, warehouse, carpenter-shop, school-house, church, and a mill. There are also the necessary quarters for the agent, clerks, medical attendant, teachers, interpreter, and other government employés. At stated times there are issues of annuity goods, farming implements, and food. All these issues are made by the agent, or under his supervision.

Indian Freedmen.—In the Indian Territory is found a class of people not included in the Indian enumeration, yet they are Indians to all intents and purposes, or rather entitled to be raised to the rank of Indians under our present laws. It is composed of the former slaves of the "Five Civilized Tribes." They number not less than 12,000, and most of them speak the Indian language. By the former treaties made in 1860, between the United States and these tribes or nations, the status of these freedmen was unfortunately left unsettled.

Several bills have been proposed in Congress to enforce the provisions of these treaties, but no positive action has been reached. In the Indian Territory the caste feeling against the freedmen is very great; in fact to advocate their equality of rights is quite as unpopular as it was to do the same for the freedmen of Virginia at the close of the civil war. Only an act of Congress can give them effectual relief. Friends of the freedmen are earnestly seeking this. It seems strange that so many thousands of people could so long be deprived of the rights and privileges which the treaties nominally give them. Of these freedmen, however, 3500, formerly belonging to the Creeks and Seminoles, form an exception; for, by an act of the "Grand Council," passed in 1880, they are fully recognized, to wit: "All persons of African descent between the Creek Nation and the United States, shall hereafter be recognized as citizens of the Muskogee (Creek) Nation."

The history of the 500 Seminole freedmen is a touching one. Transferred with the Seminoles from Florida, they first fled to Mexico to escape from bondage. There they suffered untold hardships. After a time they were persuaded to return to Texas, where for some years they wandered about in a destitute condition, often driven to beg for subsistence at the various military posts. They were finally gathered at a frontier station, there fed for some considerable time, and then returned to live with their former Indian masters.

Policy.—From the beginning of our government until 1849, when the department of the interior was created and organized, the war department had exclusive control of Indian affairs. The policy of making treaties with Indian tribes as though they were independent nations grew out of the weak condition of the colonies, and the sparseness of the white population in subsequent years. That it was wrong in principle is now admitted by statesmen; and certainly it was continued long after the necessity for it had ceased. It was an anomalous position which the Indian held, being at the same time both "sovereign" and "ward." This antagonistic relationship was maintained until 1871, when, upon the claim that now all the tribes had lost their attributes of sovereignty, and were no longer able to maintain international relations with the United States government, the treaty-making nominally ceased. But the long and abundant exercise of this power left an inheritance of evils which it will take generations to remove. Under the old policy the Indian titles to most of the lands east of the Mississippi River were extinguished; the Indians themselves were removed and located in territory west of that river; and the several nomadic tribes of the west were gathered together on reservations. The reservation system of isolating Indians was the natural outgrowth of their recognized independence and right to make treaties, and it is unfortunate that this system has been so entailed; it is a poor stepping-stone to United States citizenship with its rights and responsibilities. For the Indians on a reservation still form a small principality ruled over by the Indian agent, whose jurisdiction so far as the individual Indian is concerned is complete and final. The agent is of course accountable to his conscience and to the Commissioner of Indian Affairs, yet his government is an arbitrary one, and affords to the world the spectacle of a despotism within a republic. So that it is practically impossible for the Indian on his reservation and the white man in the neighboring county to have the same law, the same rights, and the same responsibilities.

This system is productive of many evils. The agent being relieved from direct supervision, and surrounded by a class of white men who almost invariably act as though everything to be filched from the government were clear gain; dealing with contractors eager for large profits, and with interpreters and other employés whose knowledge and habits have raised them very little above the Indians themselves; and further, coupling this social atmosphere with the fact of a salary barely sufficient to supply the necessaries of life, it is not wonderful that many agents have proved recreant to their trusts. A well-known Indian orator says of such: "On a salary of $1500, they have grown rich in four years."

Present Condition.—For the sake of a brief illustration of the present condition of the Indians of the United States with regard to their civilization, examples of four degrees are taken, commencing with the highest. 1. The Cherokees. 2. The Nez Percés of the Pacific slope and the Santee Sioux of the interior. 3. The Brulé and Ogalalla Sioux. 4. Apaches.

1. The *Cherokees* before they were transferred, in common with the other Indians of the "Five Nations," had made some considerable advancement in civilization. They were doubtless much retarded by such a transfer to a desolate country, new and strange to them, beyond the Mississippi. These people now have an alphabet simple and complete, which was invented by a full-blood Cherokee by the name of Sequoi, but also called George Guess (*q. v.*). It was introduced as early as 1824. With a printed language their literature keeps up a constant growth, and it is peculiarly their own. Besides, the education in English is universal. They seem to have as complete an appreciation of the requirements of the age as any community of white men. Many have amassed wealth; some have had their sons and daughters educated in our best institutions of learning; and their graceful native orators have been heard with wonder by committees of Congress and learned societies. They support their schools and churches with remarkable liberality. Fair newspapers are printed and edited by full-blooded Indians. They print one-half of the newspaper page in Cherokee and the other in English, and such journals are liberally sustained. In fact, their progress during the last thirty years is as marked as that of our Anglo-Saxon people in corresponding periods of their history.

2. The *Nez Percés* form a fair example of the second class. In them we have a plane of development but little lower than that of the Cherokees, and, indeed, many other tribes approach them closely in the line of advancement. The "Non-Treaty" Nez Percés, dwelling mostly outside of the Lapwai reservation in Idaho, were defeated in the war of 1877, and a remnant taken to the Indian Territory. These, in 1885, were returned to Idaho; a part of them went to the Lapwai reserve, and the remainder, including the famous Joseph, with some other prominent Indians, whose lives would be unsafe in Idaho where their outrages had taken place, joined Moses, a leading chief on the present Colville reservation. The Nez Percés "proper," dwelling at Lapwai, from the time Capt. Bonneville met them in 1837, have been always loyal to the government, and friendly to white men. They are making rapid progress in everything that pertains to self-sustaining industry. Their schools have not been as large and well attended as was hoped from their rich beginnings in 1844, when Mrs. Spaulding, the devoted missionary, at one time taught 300 of them. Still, a greater proficiency in education has been attained by a few than can be found elsewhere on the Pacific slope.

One Indian of full blood, James Ruben, is a good English scholar; he translated a part of the Bible into the Nez Percé tongue. This translation in book-form will be found in every Nez Percé house. Another, Archie Lawer, is a trained Presbyterian clergyman. He can render any English into Nez Percé, or *vice versa*, before an audience. Several others, of whom these young men are types, are equal to them in knowledge. They are working Christian men, and exert a marked influence in the moral and industrial field, among not only their own people but among the Umatillas, Spokanes, and other kindred tribes.

The *Santee Sioux* are equal if not somewhat in advance of the Nez Percés. Certainly their progress has been rapid, for it is to be remembered that in 1862 they were involved in that desperate war which formed no exception to the horrible work of Indian massacre and outrage. To-day, grouped on a small reservation, and, for a wonder, being permitted to hold lands in severalty near Yankton, in Nebraska, they present the cheering spectacle of a peaceable, law-abiding community. They are worthy in many respects of the emulation of the adjoining white settlements—honest, chaste, strictly temperate, and usually industrious. They are slowly entering into the ways of the best white men. Their children with but few exceptions are at school. Without war-paint, all wear the citizen's dress, and the prospect is that but little more of government aid will be needed for them. The first experiments in furnishing them stock and implements for agriculture were costly and seemed to little purpose; but fortunately the experiments were repeated, and the Indians have come at last to realize the value of property, and little by little have learned how to manage stock successfully. The wheat raised by these amateur farmers is daily ground at the mill, and now, something that can hardly be said of any other agency, every employé, except the physician and some of the teachers, is a Sioux Indian of full blood, *i. e.*, the miller, engineer, blacksmith, carpenter, and the minister, and part of the teachers. Still, it will be years before they overtake the Cherokees. Yet they are far in advance of their Sioux kindred at the Rose-Bud and Pine Ridge agencies.

3. The *Brulé Sioux*, soon after Gen. Grant's "Peace policy" was inaugurated, were grouped on the Missouri River, about 200 miles from what is now known as the Rose-Bud agency. There were at first some 600 children at school; a great interest was manifested by them in education, and the sanguine friends of the Indians were hopeful of a speedy progress. But soon after that, the Indians were transferred from the Missouri River to their present homes, where a reaction appears to have set in. In 1883 these Indians were fed with rations; lived in tents; the majority of them wore the blanket and the breech-clout; very few, if any, attended the divine services which were held for the half-breeds and whites; and there were no schools among them. The agent, being questioned with reference to this state of affairs, said, that his predecessor had disbelieved in the possibility of educating the Indians, and therefore abolished the schools; but that he himself believing in schools proposed to open one as soon as he could get a house constructed. These Indians at that time entertained visitors with different kinds of wild dances. One was the "Omaha" dance, where they disfigured themselves with every kind of ornamentation, painting their naked bodies in different gaudy colors, attaching feathers and strips of fur, tying beads, bells, and quantities of trinkets upon their necks, arms, and legs. Selecting a level place they danced for a long time in a circular space. Mingled with the dance were movements of the body and gyrations which were intended to indicate fighting, advancing, pursuing, retreating, defeat, triumph, and various other operations pertaining to war and to the chase. They also kept up the famous "sun-dance" in its most loathsome forms. The chief devotees went so far as to take up portions of the skin on the back and breast and attach, by cords, a large buffalo-head, and continue to leap and dance until the flesh was torn asunder or the dancer fainted from sheer exhaustion.

The Indians here appeared to be generally well disposed toward each other and toward the whites. The agent had a good police force composed of Indians, uniformed and paid by the interior department. They assisted him in the execution of his instructions and in the administration of justice. Yet the evidences of progress to a visitor were, in 1883, very few indeed and unsatisfactory. The whole method of dealing with the tribe appeared to be calculated to encourage dependency and pauperism. There were then few farms, and the farming was poorly done. No other industries were apparent.

An intelligent visitor, however, in 1885, two years later, noted a marked change, which was in a great degree attributable to the efforts of the present agent. He believed in the efficacy of education. Under his administration schools were organized and churches encouraged; there were services by a native preacher in the Dakota language. Several societies have successfully introduced missionaries, and their ameliorating influence is noticeable. The Indians have at last given up the "sun-dance." This surrender caused the agent a struggle; but their cruelty still manifests itself upon the poor dumb brutes which are turned over to them for slaughter. The 8000 Indians formerly, in 1883, encamped in a large village near the agency. They were then living in dirty wigwams, surrounded by accumulations of filth; but now through the efforts of the agent they are distributed to different parts of the reservation in small groups or villages, coming in only to receive their supplies. Many, with the liberal government help afforded, have put small farms under cultivation and have been aided in the erection of comfortable houses. To encourage them in the line of work, the hauling of supplies was intrusted to the Indians. This agency is 40 miles from the nearest railroad depot. The teamsters come there in contact with the whites, and soon dress as they do; save up a part, at least, of their wages, and thus gain in independence and thrift. Under influences at work, the tribal pressure is giving way. After the death of Spotted Tail, the claims for the chieftainship were many, but fortunately none attained much authority or influence with the tribe. These Indians now begin to realize for the first time that they must subsist like white men and learn their ways.

At the *Pine Ridge Agency* there are 7800 Ogalalla Sioux and 800 Northern Cheyennes. What has been said of the Brulés at the Rose-Bud in the way of advancement and its methods is true of the Ogalallas. A close observer, however, can see but little improvement in the Cheyennes of this reservation from the time they were captured in 1877 till to-day, although subjected to the same privileges and treatment as the Ogalallas. There is a marked difference in the mental characteristics of tribes living in the same neighborhood. There has been a contest, both secret and open, between the agent and the Indians at Pine Ridge. Those who follow the old wily chief Red Cloud have plotted with white men against the orders and wishes of the agent. The struggle is believed to be a strife between the adherents to the old tribal organization and the new policy which seeks to suppress it and to induce the Indians to abandon their old customs. The two factions are about equally divided. The agent has an Indian police force fifty strong. The Indians composing it are remarkable for their activity and fidelity. The agent says of them: "The Indian policeman carries out his orders to the dot, and unlike many of his white models of the East he is no respecter of persons. The Eastern philanthropist or Western cowboy, the Indian chief or the ordinary buck is all the same to him in the line of duty."

4. Concerning *the Apaches* Gen. George Crook, the department commander of Arizona, truthfully says: "This tribe unquestionably represents the wildest, fiercest, most cruel, and barbarous, in all their habits and instincts, of the American Indians." . . . "They are children in ignorance but not in innocence." For years murderous bands of these have been the terror of our south-western frontier. They did formerly live by hunting and gathering wild fruits from fields and cultivating small patches here and there whenever their nomadic ways would permit. When fruits and game were scarce they have always supplemented them by piratical forays into the villages of New Mexico and Arizona, often extending them across the border into Mexican territory. The hamlets of the scattered settlements were never safe from their plundering. Again and again pursued by the troops they have been tracked to their mountain fastnesses by a trail of blood. Our best military commanders with all available forces have been sent against them and have never yet been able to conquer a lasting peace. This state of affairs has been aggravated particularly of late by a divided control. There is a conflict of jurisdiction between the representatives of the war and interior departments. In July, 1883, for a time the experiment was tried of giving the sole control of the hostile Apaches to the department commander, who assumed personal responsibility for their good behavior. As a consequence, for two years there was quiet and peace in Arizona. He became their friend; he placed them upon fertile lands, and while he had them carefully

watched, they were furnished with agricultural implements, clothing, and rations, and immediately set to work. The men as well as the women became industrious. The manufacture of "tiswin" (an alcoholic drink of their own brewing) was suppressed and prohibited in orders. Under this good management the Indians have wonderfully changed and the most of them remained loyal to the authorities over them. But at last the old conflict of departments caused changes and weakened the control. A few bad Indians violated the orders, made "tiswin" and became wildly drunk. Then immediately under bad leadership a few, fearing summary punishment, escaped from the reservation and recommenced their depredations and outrages. Yet it is pleasant to find that the large majority have remained behind and are doing well.

The Apaches on the *San Carlos* reservation of Arizona have 1000 acres of land under cultivation, and the last year, 1885, raised 700,000 lbs. of barley and nearly the same amount of corn. They now own 1800 head of cattle and a few flocks of sheep.

On the *White Mountain* reservation near Fort Apache, Arizona, the Sierra Blanca Apaches, 1600 in number, have been for the last three years self-sustaining. They own over 2000 sheep, all purchased, without direct government aid, from the savings on the beef ration. They have under cultivation 2120 acres of land, and in 1885 raised 80,000 lbs. of barley, 3,500,000 lbs. of corn, 1,710,000 lbs. of cut hay. Besides they raise squashes, melons, beans, sweet potatoes, and other edibles, of which no accurate account is taken. One of the most hopeful features is the fact that now the men work as industriously as the women. The taking of 200 men as scouts from them had the effect to seriously impair their agricultural operations in 1885. An officer of the army on duty with them says: "One family, consisting of one man, one boy about 16, and one woman, built a dam across Carizo, dug a ditch one-quarter of a mile in length, cleared up the land, raised 3 acres of barley, 2 acres of corn, ½ acre of beans, the same of melons and pumpkins, and all they had to work with was an old axe and a poor hoe." On May 17, 1885, the wild Apaches of whom mention has been made, 134 in number from the Chiricahua band, fled from the reservation for the warpath. Adopting their old tactics they have gone to the mountains of Arizona and Old Mexico, from which they have issued for murder and robbing as aforetime. In February, 1886, the leader of this band and part of his followers again surrendered to our troops.

By this sketch it is evident that civilization is gradually gaining among the Indian tribes, and it will not be long before the "Indians untaxed," referred to in our fundamental law, will become incorporated with our heterogeneous people, and be held to the same accountability, while they shall be endued with the same privileges as other citizens of this republic. This will be accomplished sooner by an early change of the methods employed. The chief instrument of progress is the school.

The Alaska Indians, with their long, stout bodies and short legs, carry enormous loads of ore from the mines, high up in the mountains, to the places of transportation. They also gather fish and seals. The Indians on the Puget's Sound cut the large trees, float them to the mills, aid in sawing lumber, and load it upon ships for the world's building. The Navajos and Zunis have large flocks of sheep. The Nez Percés and the Indians of the interior keep increasing their stock of horses and cattle. But the larger majority of the 260,000 aborigines are already cultivating land.

These pictures show that the simple distribution of the land in severalty will not meet all the necessities of the case; but what is needed is a practical education in books, in trades, in business, whether it be mining, fur-gathering, fishing, stock-raising, or farming. Such a practical education has been given already to hundreds, so that its possibility is no longer a question at issue; but for a time sufficient power must be exercised by the government to keep the Indian children at school for a term of years; and certainly the whole is said when it is declared that these schools should be organized, as is now being done on a small scale, for both the *mental culture* and instruction in *the industrial arts.* A proper practical instruction will of course fit them to fill the places which are afforded them where they are now located, and other places every day opening to their industry. (O. O. H.)

INDIAN TERRITORY. In the early part of this century the Choctaws, Chickasaws, Creeks, and Seminoles had their dwellings in Georgia, Mississippi, Florida, and Louisiana. The Cherokees were mainly along the banks of the Tennessee. A remnant still remains at Qualla, on its head-waters, the only Indians in the South. These tribes are more or less related, having dialects of the same general language.

See Vol. XII. p. 874 Am. ed. (p. 833 Edin. ed.).

As early as 1824 Pres. Monroe in his message called the attention of Congress to various evils which were constantly on the increase; for example, the conflict of authority between State and United States jurisdiction, the physical and moral degradation caused by the mingling of dissolute characters with the Indians, and the feuds which constantly arose between the Indians and whites, owing to various encroachments upon their family rights and tribal claims. As a remedy he recommended the exchange of lands, giving the Indians territory beyond the Mississippi, and their removal thither provided their consent could be obtained. The measure was strongly advocated by the friends of the Indians and of the administration, and as ardently opposed by others who objected to an Indian sovereignty. After discussion, an act of Congress was passed, May 28, 1830, which fully authorized the proposed exchange and the removal of these Indians and several others, namely: the Cherokees, Choctaws, Chickasaws, Creeks, Seminoles, and most of the remnants of the Six Nations, the Wyandottes, Senecas, and Shawnees, and, generally speaking, all the tribes located within the limits of organized States east of the Mississippi, when they should consent to remove. All was to be done at the expense of the general government. The territory set apart was separated into tracts proportional to the number of Indians in each tribe. The title was vested in the tribe and proper protection promised. The resulting treaties gave the Indians substantial control of their own affairs, and secured their lands against inclusion in any State or Territory in the Union.

During the next ten years subsequent to the act the Indian titles east of the Mississippi were for the most part extinguished, and the Indians settled on lands west of that river. Their territory at first comprised the unorganized portion of the "Louisiana purchase," embracing the present Indian Territory, Kansas, and part of Nebraska. By several treaties the Indians were induced to relinquish the larger portion of the original lands. These were obtained from them by liberal compensation, the government having invested the funds, the interest of which is paid to them in money in annuities, or otherwise expended for their benefit. The abundant legislation affecting these Indians will be found in the "Trade and Intercourse Laws" and appropriation acts of Congress. Until 1871 the government persevered in dealing with them by treaty, as if each tribe were an independent nation. But in that year a wholesome decision was arrived at, to make no more treaties within the United States jurisdiction. Then the fiction of independent sovereignties very properly ceased.

The present area of the Indian Territory as last reported comprises 64,223 square miles, or 41,102,546 acres.

Several tribes from Iowa, Nebraska, and Kansas—for example, the Iowas, Poncas, Otoes, Delawares, and the Kaws—have in recent years been transferred to the

Territory, as those States have gradually filled up with whites. The Sacs and Foxes were sent thither from the Upper Mississippi. The Modocs were carried from Oregon as prisoners of war after their terrible outbreak and massacre in 1873, and located in the northeast corner of the Territory, where they seem to have outstripped their neighbors in the fruits of industry and education.

In 1877 the troubles of long standing caused by the treaty reductions of the Nez Percé reservation in Idaho and Eastern Oregon culminated there in an open rebellion. Those who rebelled were several sub-tribes, like that of Nez Percé Joseph, which never consented to the treaties that narrowed their limits. These "non-treaty" Indians murdered the inhabitants, fought the soldiers, and then fled to cross the continent through Idaho, Montana, and Dakota, with a view of joining the malcontents of the Sioux, who were at that time on British soil. The United States forces from the Columbia, increased by those in the department of Dakota, fought and pursued the fleeing Indians for over 1300 miles. They were finally overtaken, successfully beaten, and captured when within 50 miles of their proposed destination. A portion under "White Bird" escaped; the remainder, between 300 and 400 men and women and children, were thereafter transferred to the Indian Territory and located on the Salt Fork of the Arkansas River. The original hardships to which these Indians had been subjected, the losses of seven-eighths of their number during the war, the deaths that were very abundant in their new home, especially among children, and the consequent gloom which settled down upon them as a tribe, excited in the country deep and wide-spread sympathy. This finally resulted in an act of Congress, March 3, 1885, which authorized the secretary of the interior to send them away to any other reservation which he might choose. They have since been escorted by troops, back through Kansas, Nebraska, and Wyoming, to Idaho. A portion has joined the Nez Percés proper; and the remainder, including Joseph, have united their fortunes with the Colville Indians, of Washington Territory.

Progress.—The following statement affords a glimpse into the present condition of the inhabitants of the Indian Territory. It relates to the 5 civilized tribes of the Territory—Cherokees, Creeks, Choctaws, Chickasaws, and Seminoles. Of these, in 1884, there were 64,000 who wore citizen's dress, and 45,000 spoke English enough for ordinary conversation. There were 13,600 families engaged in agriculture, and 1017 in other civilized pursuits. The male Indians who thus labor numbered 9500. There were 14,250 houses occupied by Indians, and 178 church buildings; missionaries, 93. Agricultural statistics are as follows:

	1880.	1881.	1882.	1883.	1884.
Acres cultivated	314,398	348,000	370,000	400,000	320,000
Wheat, bushels	336,424	105,000	180,000	245,000	280,000
Corn, bushels	2,346,042	616,000	1,125,000	1,255,000	1,615,000
Oats and barley, bushels	124,568	74,300	119,500	202,000	313,000
Cotton, pounds	16,800	....	6,050,000	5,900,000	
Horses owned	61,453	64,600	50,500	78,500	87,000
Mules owned	5,138	6,150	5,446	33,070	26,570
Cattle owned	297,040	370,000	455,000	600,000	710,000
Swine owned	400,282	455,000	385,000	466,000	530,000
Sheep owned	34,034	33,400	36,450	46,000	81,000

The total number of acres in reservation was 19,785,771, of which 8,870,000 were tillable, 890,000 were fenced, and 320,000 were under actual cultivation.

Besides the Indians of the 5 civilized tribes there were 18,531 Indians of other tribes, and also 30,000 whites lawfully on the reservation, and 6000 whites unlawfully. Much ready money has been obtained by different tribes from leasing tracts of their land to the owners of herds of cattle.

A visitor to the Territory finds the children intelligent and progressing as rapidly as the children of whites in corresponding conditions of life. Yet judging by the poverty of individuals and by the excessive criminal lists which appear in the U. S. courts of Western Arkansas, embracing those Indians who have violated United States laws and come under United States jurisdiction, it appears evident that there is something defective in the present internal government of the Territory. For many years leading statesmen have advocated the resumption of United States control, and the giving to this Territory a territorial form of government. Doubtless this will be effective just as soon as the consent of a majority of the Indians therein can be obtained. During the civil war, from 1861 to 1865, a majority of these Indians joined the rebellion or gave their sympathies in that direction, thus working a forfeiture of former treaty rights. An alien government within United States limits is certainly an anomaly. It will be wise for the government itself, and most healthful for the people of the Territory, to spread over them the same shield of protection and demand of them the same obligations as pertain to the citizens of other Territories. Under the proposed legislation United States citizenship will be extended to the inhabitants, but it is an excellent proposition for the organic act to cause the distribution of the land in severalty and to prevent its alienation for a term of years.

Education.—There is now much irregularity of the school work in the Indian Territory. The people have not the same wholesome system as that which prevails for white children in Dakota, Montana, and Idaho, yet the reports from the various agencies engaged in the work of education among the Indians and freedmen are interesting and to some extent encouraging. As in the early work among the negroes of the South, the efforts of the government are supplemented by several missionary societies. Under these agencies there has been a decided advance in the last five years; a number of institutions of higher education have been established and set at work. The most promising of the children are from time to time selected and sent to some one of the various training-schools of the East—for example to Carlisle, Hampton, and others; and many children of those people who are able to pay have succeeded in entering universities and colleges in different parts of the country. These are reported as taking standing with the best.

Of late years manual training has come into vogue; and as there is little or no apprenticing it is well that it is so. Among the Indians this training is combined with elementary instruction in the English branches. It includes rudimental carpentering, blacksmithing, shoemaking, and other such trades for the boys; sewing, knitting, butter-making, and general housework for the girls; and of course all sorts of farming, including fruit-raising and gardening and the managing and breeding of stock, have not been neglected.

The children are much scattered and often obliged to accomplish long journeys daily to secure the privilege of the day-schools; and for the same reason in some localities there are no schools. The people, however, so circumstanced, manifest a keener appreciation of the benefits of education than the white population bordering upon their territory. They begin to realize that in the competition with other races they must go to the wall and be beaten, unless well equipped with useful knowledge. They earnestly desire, as Indians always have, never to become the "hewers of wood and drawers of water" for other people.

The Cherokees, having a population not above 25,000, have 4000 children at school. It is hoped that a recent proposition—namely, to have all the boarding-schools introduce *manual training* — will speedily receive the approval of the general council. All these hopeful features apply to the more civilized tribes. Among others, such as the Cheyennes, Arapahoes, Pawnees, Otoes, and others, the usual degradation of savage tribes still exists, although in different degrees. Some are very bad and even worse than the wildest Indians of the plains; for we find here polygamy, the buying and selling of marriageable girls, the horrid sun-dance with its cruel lacerations of the flesh, and other heathenish rites with abundant superstition. There is ample room yet in this field for the most earnest and persistent missionary labors.

The following statistics, taken from the Indian Commissioner's Report for 1884, will give a notion of the state of educational work:

	Boarding.	Day-Schools.
Number of schools....................	17	201
Number of pupils that can be accommodated.........................	1504	9200
Number of pupils attending.......	1316	6546

The cost of maintaining these schools was $196,612, of which the Five Nations paid $175,071; and religious societies $21,541.

A few words will indicate the abnormal condition of the government within the Territory. The treaties of 1866 constituted the "general council." It is a legislature with representatives from each tribe, having certain defined powers; for example, "Said council shall have power to legislate upon matters pertaining to the intercourse and relations of the Indian tribes and nations and colonies of freedmen resident in said Territory; the arrest and extradition of criminals and offenders escaping from one tribe to another, or into any community of freedmen; the administration of justice between members of different tribes of said Territory, and persons other than Indians, and members of said tribes or nations; and the common defence and safety of the nations of the said Territory." The council meets yearly. The laws enacted by this council are taken cognizance of judicially by Indian courts; but criminal cases where white men and Indians are parties, or where both are white, are tried by neighboring courts outside of the Territory. In the Western Judicial District of Arkansas about four-fifths of the cases proceed from the Indian Territory. There has been an earnest demand from the Indians and their friends for the establishment of a U. S. court within the Territory. The advantages are evident. The witnesses will be more accessible and the expense far less. Lawless characters take advantage of the present division of the courts and the reluctance of witnesses to waste time and incur expense, so that crime is multiplied from this cause.

If a complete territorial government is not yet practicable, every interest of humanity and of progress demands, at least, the introduction of a good and a thorough system of *judicial tribunals*, these to be established by the general government. This will be a stepping-stone to a proper self-government in keeping with the uniform policy of the United States elsewhere; thus they will be treated the same as white people. At present our fundamental general laws touching the freedmen have been practically nullified in much of this Territory. Properly organized U. S. courts would soon remedy this evil.

OKLAHOMA.—The first recorded account of the country of which "Oklahoma" constitutes a part is given by a Spaniard, Don Diego Dionisio de Penalosa, who visited it in March, 1662, while on some mission northward. In a quaint style he says: "Through pleasing, peaceful, and most pleasant fields that, not in all the Indies of Peru and New Spain, nor in Europe, have any such been seen so pleasant and delightful, and covered with buffalo or cows of Cibola, which caused notable admiration. The further we entered the country the greater was the number; with many and very beautiful rivers, marshes, and springs; studded with luxuriant forests and fruit-trees of various kinds, which produced most palatable plums; large and fine grapes in great clusters, and of extremely good flavor, like those of Spain, and even better. Many mulberry trees to raise silk; oak, evergreen oak, elm, ash, and poplar trees, with other kinds of trees; with useful and fragrant plants, clover, flax, hemp, marjoram high enough to hide a man on horseback; abundance of roses; strawberries without end, small but savory; many Castilian partridges; quails, turkeys, sandpipers, and pheasants; deer, stag, or elk, in very great numbers, and even one kind of them as large and developed as our horses. Through these pleasant and delightful fields we marched during the months of March, April, May, and on the kalends of June arrived at a large river which they called Mischipi." He did not exaggerate the fertility and productiveness of this beautiful region; Oklahoma in the Indian tongue signifies "Beautiful Land."

Contrary to the usual view, Oklahoma lies in the very centre of the Indian Territory. It forms a curious wedge, with the head to the north and the point to the south, between the several tracts or subdivisions which have been set apart for the most civilized Indians. The Creeks are on the east, the Cheyennes and Arapahoes on the west, the "Cherokee strip" on the north, while the Chickasaws form the southern boundary. In order to comprehend the situation of this famous tract it is necessary to examine minutely many Indian treaties made since 1856; for example, all those of the Creeks, Seminoles, Cheyennes, and the Arapahoes, and also the "executive orders" setting apart reservations for other Indians, namely: the Sacs and Foxes, the Seminoles, Pottawatamies, the Iowas, and Kickapoos.

According to these treaties and orders the Oklahoma boundary begins at the north-west corner of the Creek Nation, thence west 100 miles to the Cimarron River; thence southerly along that river to where a longitudinal line drawn 10 miles east of the 98th parallel crosses it; thence due south to the Canadian River; thence south-easterly along that river to the "Indian Meridian;" thence north on said meridian to the Cimarron River; thence down said river to the western Creek boundary; thence north to point of beginning. The "Indian Meridian" is the west boundary of the Pottawatamie, Kickapoo, and Iowa Reserves. The district thus traced embraces 85 townships, nearly 2,000,000 acres. It is surveyed and mapped like the public lands outside of the Indian Territory.

Present Status.—During the war of the rebellion the Creeks and Seminoles held the district known as Oklahoma entire, under cover of the treaties of Aug. 7, 1856. They, however, forfeited all rights and benefits accruing under those treaties by entering into other hostile treaty stipulations with the Southern Confederacy. They espoused the cause of the seceders. After the close of the war the U. S. government, in its liberal policy, extended to these "Nations" a general amnesty, but demanded in return the western half of the Creek reserve and *all* of the Seminole holdings which were given under the treaties of 1856. This new deal was effected by the treaty dated June 14, 1866. These treaties, which made exactions, did, however, provide a new and adequate reservation for all the Seminoles, by selling them a tract lying just west of the new Creek Nation.

The United States paid the Creeks 30 cents per acre for their cession, and 15 cents an acre for the lands given up by the Seminoles. These cessions were solicited by the United States, and made by these nations on account of the urgent need of the United States for more land in the Indian Territory, and the intention of the United States to send and to establish there other Indians and freedmen. It does not appear that these lands have been set aside, except in the treaties, for the purposes above mentioned; and certainly they have not yet been occupied or used according to the treaty stipulations.

The portion of Oklahoma north of the Cimarron given back to the United States by the Creeks in 1866 was afterwards by treaty given in grant to the Arapahoes and Cheyennes. (See treaty of Oct. 28, 1867.) By an unratified agreement of date Oct. 19, 1872, the Cheyennes and Arapahoes stipulated to relinquish their lands so granted, and accept others in lieu of them, which constitute the reservation which they now occupy. But because their agreement was not ratified these Indians still claim this portion of Oklahoma and also the "Cherokee strip."

These claims, probably groundless, complicate matters very much; for certainly these Indians, like a man exchanging his horse for another, cannot have valid claim to both. Again, the Pre-emption Act of Sept. 20, 1844, comes in. It provides that "all lands, where the Indian title is or shall hereafter become extinguished, shall be subject to this act," *i. e.*, this act of pre-emption. Further, the supplemental Homestead Act of 1879 declares that "All lands belonging to the United States to which the Indian title has been or may be hereafter extinguished shall be subject to the right of pre-emption, under the conditions, restrictions, and stipulations provided by law." Finally, by acts of Congress, the further location and removal to the Indian Territory of the Indians of New Mexico, Arizona, and the Sioux tribes of Dakota is expressly prohibited without the sanction of Congress.

This showing makes it quite clear that Oklahoma has resumed substantially the ordinary status of the "public lands." It certainly gives the color of right to those citizens who claim that this district is public land within the meaning of the law, and subject to entry under the homestead and pre-emption rulings.

These people claim that besides the acts of 1876 and 1878, which prohibit the use of it for the location of Indians thereon, that sole jurisdiction of the government was demonstrated by the granting to railways the right of way through this land without consulting the Indians, and by also including certain sections of it in a "land-grant." They show also that the principal opposition to its use for the settlements of whites came from the "cattle-men," who held, without authority, the whole of Oklahoma for grazing purposes. The "cattle-men," however, had leases which they obtained from the Indians, which of course the Indians had no right to give. Of course complicated difficulties would arise where such a bungling settlement was had of most important questions of title and status. These are surely left in doubt by the records.

Attempted Settlements.—Certain restless people living in the States adjoining the Indian Territory, as early as 1879, eagerly seeking new homes, undertook in groups to cross over the intervening strip of land and enter Oklahoma; but the first regularly organized effort was made in the fall of 1880, being led by the famous David L. Payne, a former captain of volunteers, and later an officer in the regular army, and then a *bona fide* frontiersman. He set out in December with some 600 followers, having 325 wagons, but he was closely followed up by the U. S. troops, so that he had hardly reached the Kansas line when he was arrested by the U. S. marshal and his colony disbanded. Payne was carried to Fort Smith, Ark., and there brought before the U. S. courts and fined $1000 for trespassing on Indian lands; but as he could not pay the fine, and as the law made provision for no other punishment, he was soon thereafter set at liberty. Payne set in motion four other colonies, which made attempts for the settlement of Oklahoma.

Each time he succeeded in getting into that Territory with his followers. They were, however, immediately pursued by U. S. soldiers, arrested by them, and returned to Kansas. The settlers had at one time gone so far as to locate buildings, and had even planted crops, but their improvements were at once destroyed. Payne was tried a second time by the U. S. court at Topeka, Kan. This was in 1884, at the fall term. The questions raised by this arrest involved directly the nature and validity of the treaties of 1866. The judge who rendered the decision, after a careful consideration of these treaties, declared that the lands in question were "public lands," and that Payne, therefore, in settling upon them, was guilty of no crime. He was again discharged. Elated by this gratifying success, he proceeded at once to organize another expedition. But before the colony was ready to start he died, Nov. 28, 1884.

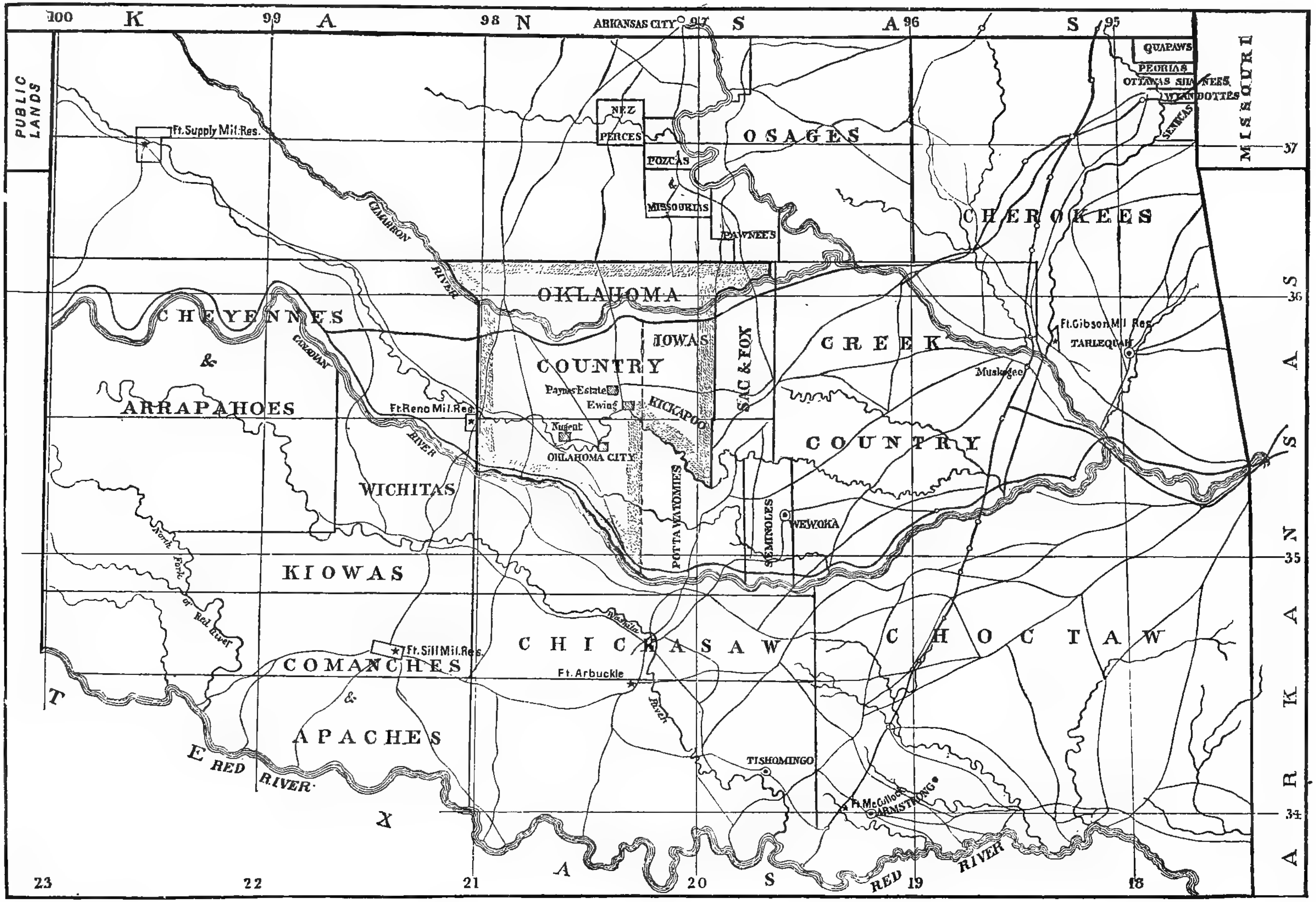
A member of the colony, W. J. Couch, succeeded to his authority, and led the expedition to Oklahoma, where the members of it were again taken by the troops and brought back to Kansas. Couch was put under arrest. As the matter now stands before the courts, the decisions appear to be in favor of the colonists. The cattle-men, who leased from the neighboring Indians at a nominal price per acre, paid no State tax, and therefore had for themselves a very good financial arrangement. Their success encouraged the enterprising settlers also to proceed to the Territory. But, as we have seen, these leases were made without authority or sanction by the government, and were therefore void. Still, the government authorities had thus far made no attempt to remove this class of intruders. Now, as the new colonists claimed only the same right as the cattle-men to go and remain, the "Boomers," as the settlers were called, obtained much sympathy among the people of the whole country. This sympathy soon created a public sentiment which, together with prospective Indian troubles, finally induced the President to order the removal of all cattle from the Oklahoma district. The order, though not yet fully executed, has had the effect to disorganize the sanguine "Boomers."

Probably no other organized attempt at forcible entrance and settlement of Oklahoma will ever be made; and all lovers of order, within and without the Indian Territory, desire that Congress and the courts shall make some permanent adjustment of the long conflicting claims. The best plan suggested is, without doubt, to get from the Arapahoes and Cheyennes by negotiation a strip farther west, one which borders upon Texas and Kansas, and restore Oklahoma beyond question to Indian use. Then open the western strip to the public entry and settlement for citizens of the United States. (O. O. H.)

See Vol. XII. p. 884 Am. ed. (p. 843 Edin. ed.).

INDIGO. Before cotton-raising became general in the Southern States, indigo was one of the great staples of agricultural production and of plantation-manufacture. South Carolina and Georgia were the principal seats of this industry. Foreign indigo-seed was at first employed, but later on native species of indigo-producing plants obtained the preference. The culture of indigo in this country dates from about 1740. In 1747, 134,118 pounds of indigo were exported, and in 1756, 216,924 pounds. Before the Revolutionary war the annual export came to exceed 1,000,000 pounds; but as the culture of cotton began to extend the indigo crop gradually declined. (Full figures, apparently based on official returns for each year as long as the indigo crop was worth reporting, may be found in the *Agricultural Reports of the U. S. Patent Office.*) The production of indigo did not entirely cease until about the time of the outbreak of the civil war in 1861. There are in the Southern States at least two recognized native species of true *Indigofera*, besides another which has become locally naturalized. The latter kind was the species preferred on some farms in the South. But in other places the common *Baptisia tinctoria*, or wild indigo, a plant almost everywhere abundant from Canada to the Gulf of Mexico, had the decided preference. Of the genus *Baptisia*, which like *Indigofera* belongs to the Leguminosæ, the Atlantic and Gulf States have some 13 species. It would be interesting to know whether any other of these species could be utilized in the manufacture of the dye-stuff. An allied shrub, *Amorpha fruticosa*, has been employed as an indigo-plant.

INDIAN TERRITORY, SHOWING OKLAHOMA. *PLATE XXXII.*



See Vol. XII. p. 887 Am. ed. (p. 846 Edin. ed.).

INDULGENCE (Lat. *indulgere*, to allow), in the Roman Catholic Church, the remission of the temporal penalty due to actual sins already remitted as to their guilt; granted externally to the sacrament of penance by those who have the power of distributing the spiritual treasures of the Church. According to Bellarmine (*De Jud.*, l. i. c. i.) the word, as used in Scripture and in ecclesiastical councils and writings, denotes remission, condonation, release. It is employed, moreover, to signify both the relaxation of the canonical penances of the primitive Church (to which meaning non-Catholic writers limit it), and the remission before God of the temporal punishment which the Catholic Church holds attaches to sin even after the guilt and the eternal punishment due to grievous sin have been remitted.

History.—Tertullian (*De Pudicitia*) and St. Cyprian in his *Epistles* are witnesses not only for the severity of the penances inflicted upon apostate Christians desirous of being restored to the communion of the Church, but also for the existence of a system of indulgences which readmitted the penitent under easier conditions than those enjoined by the canons. These indulgences, or relaxations of the penitential rigor, were granted by the bishops at the instance of the martyrs and the imprisoned confessors of the faith, who gave *libelli*, or letters, to their weaker brethren. That these indulgences were not regarded as simply relaxations of the external penance, but as really availing before God, seems clear from the language of Tertullian, inasmuch as the satisfaction of the martyrs could not be applied to the remission of canonical penance in the external tribunal. This, indeed, would be a real injury to the penitents, since by such an indulgence they would have become more displeasing to the divine justice as being dispensed from salutary penance. There is certainly a mass of tradition in favor of the belief that the good works, sufferings, etc. of the more perfect members of the Church availed in behalf of the weaker members; and the teaching of St. Paul touching the oneness of the Church as the body of Christ, and the mutual helpfulness which such a figure implies, came with peculiar force to the minds of the primitive Christians, who were closely united by persecution. The idea of the "Treasure of the Church" is shadowed not dimly in the writings of the Fathers, particularly St. Cyprian, who prescribes rules (*Ep.* x.) for the use of the privileges secured to the faithful by the sufferings of the martyrs. His censure of the abuse of the privileges does not affect the historical verity of their existence, or the belief that the merits of the martyrs and confessors might be applied to the remission of the punishment due to sin. Tertullian, who, when he wrote *De Pudicitia*, was under the sway of Montanist rigorism, blames the martyrs for assuming the privileges of Christ. Such expressions lift the question of indulgence above that of the mere mitigation of canonical penance, and point to a primitive belief in the supernatural efficacy to the faithful of the merits of the saints.

The cessation of the persecutions changed the methods of granting favors to worthy penitents; still, we find the Council of Ancyra (A. D. 314), the Council of Nice (325), and the fourth Council of Carthage (398) leaving the use of this faculty to the discretion of the bishops. As the primitive fervor cooled, the Church deemed it advisable to substitute for the canonical discipline, prayers, alms-deeds, and other pious practices. No one questions the existence of indulgences, in the Roman Catholic sense, from the fifth century.

It is undeniable that the relaxation of the canonical discipline, particularly amid the Teutonic nations accustomed to purchase immunity from punishment for grave crimes by pecuniary mulcts, tended to introduce abuses in the matter of indulgences. The Council of Châlons (813) condemned the prevalent error that almsgiving releases the sinner from penance. The plenary indulgence proclaimed at the opening of the Crusades to all who, having confessed and repented, would join the expedition, was subsequently extended to all who would further the Christian cause with money and military stores. During the Western schism also the anti-popes proclaimed many indulgences, and these abuses, though repeatedly condemned by popes and councils, were spread further by the questors and preachers of indulgences, who were suppressed finally by the Council of Trent. Benedict XIV. condemned as false all rescripts of indulgences promising remission of both sin and its punishment. Although there were abuses connected with the publication of indulgences at the period of the Reformation, Luther's charges were met by Tetzel in a document which sets forth clearly the Church's doctrine concerning indulgences as remissions, not of sin, past, present, or future, but only of its temporal punishment.

Doctrine.—An indulgence, as stated by approved Catholic theologians, is remissive simply of the temporal penalty due to sin. It is a first principle of the faith that no sin whatever is remitted *quoad pœnam*, as to its punishment, until it has been remitted *quoad culpam*, or as to its guilt. An indulgence does not come into operation until sin, even venial, has been forgiven, either by means of sacramental absolution or as the effect of true contrition. It does not produce justification, but presupposes and follows it. In no imaginable case can an indulgence be the remission of sin, much less its permission. It takes place only after sin has been removed, and regards its punishment only. The Church holds that sin, in addition to its guilt or intrinsic malice (*reatus culpœ*), renders the sinner also liable to punishment (*reatus pœnœ*), either here or hereafter. She claims the power of remitting the guilt of sin, and, in consequence, its eternal punishment. Can she also condone the temporal punishment? This, she holds, was done by St. Paul in the case of the incestuous Corinthian (2 Cor. ii. 10). The power of binding and of loosing conferred upon St. Peter, and subsequently upon the apostles collectively (Matt. xvi. and xviii.), is also adduced in favor of the doctrine. The teaching concerning the existence of the "treasure of the Church," whilst not strictly of faith, is among the *proxima fidei*. According to this, the infinite merits of Christ, who is the source of all sanctity in his members, and the good works of the saints, form a treasure which is not "tied up in a napkin," but designed for the benefit of all his members, whose sins, having previously been forgiven, yet remain subject to expiatory punishment. A plenary indulgence remits the entire satisfaction due to God; a partial only remits it in part. The jubilee does not differ from an ordinary plenary indulgence, but in the more extensive jurisdiction and absolving faculties conferred upon confessors.

The application of indulgences to the souls of the departed is by way of help or intercession (*per modum suffragii*). The living obtain the indulgence and present it to God, who may or may not accept it, for the departed soul; but the Church assumes that he *does* accept it in ratification of her action. The indulgence of a privileged altar was explained by the Sacred Congregation of Indulgences (July 28, 1840) to mean, as far as regards the mind of the grantor and the use of the power of the keys, a plenary indulgence which forthwith liberates the soul from all the pains of purgatory. As regards the effect of the application, such an indulgence is meant as corresponds in its extent with the good pleasure and acceptance of the divine mercy. Benedict XIV. explains these altars as being privileged, "each time the eucharistic sacrifice is offered, to possess, set apart, a sufficient portion of the Church's treasure of merits to obtain from God, if it so pleaseth Him, the release of that soul from purgatory." Certain dispositions, such as the intention of gaining the indulgence, the state of grace, and a faithful discharge of the pious works prescribed, are necessary to obtaining the benefit of an indulgence.

Literature.—P. Antoine Maurel (S. J.), *Le Chrêtien Éclairé sur la Nature et l' Usage des Indulgences* (Pelagaud, Paris and Lyons): this work has the approbation of the Sacred Congregation of Indulgences, and is authoritative; J. Bouvier, *Traité des Indulgences* (English translation by Rev. F. Oakley, London, Burns, 1848); Wiseman's *Lectures on the Doctrines and Practices of the Catholic Church* (London, 1844; Baltimore, 1852). (J. V. O'C.)

INDUSTRIAL EXHIBITIONS. The exhibition of industry of the present century, the lineal successor of the market fair of the Middle Ages, which yet survives in the annual fairs of Leipsic, New Novgorod, etc., had its inception in the exhibition of the London "Society of Arts," which has been held annually since 1761. Within the present century local and national exhibitions of this character have become numerous, and have expanded and grown diversified, until they have become among the most popular and useful institutions of the age. In the United States exhibits of the mechanical arts have been periodically made by a number of institutions devoted to mechanical progress, first and most important among which are the Franklin Institute of Philadelphia, founded in 1824; and the American Institute of New York, founded four years later. These two institutions have given many periodical exhibitions of industry, and have done much to stimulate invention and awaken popular interest in the mechanic arts. Similar institutions have since been organized in several of our large cities, in some of which are permanent buildings devoted to annual exhibitions.

The agricultural population has been equally enterprising with the mechanical, and State and county fairs return as regularly as the harvest season. The first agricultural fair in this country was held at Washington, in October, 1804, at the suggestion of the Commissioner of Patents. For some short time this was semi-annually repeated, while a second fair was instituted in Georgetown, D. C., in May, 1810. In 1816 the Massachusetts Society held a fair at Brighton, with a much extended system of premiums. Since that time agricultural fairs have spread to nearly every State of the Union, and are held annually in very many counties. Their original application to the rural industries has been extended to embrace mechanics as well, so that our present State and county fairs embrace specimens of all the products of city and country throughout their districts.

To the local fair Europe early added the national one, the first of these being held in Paris during the stormy era of the Revolution. The honor of their inception belongs to the Marquis d'Aveze, commissioner in 1797 of the Sevres porcelain, the Gobelin tapestry, and the Savonnerie carpet works. He hoped to overcome the depressed condition of these industries by exhibiting their products to the public, but was banished from the country before he could open to the people of Paris the exhibit he had prepared. On his return in 1798 he carried his scheme into effect by an exhibit of the above named, with other articles, at the Maison d'Orsay. The idea thus inaugurated was quickly taken up by Napoleon, who in the same year organized a national exhibition of industries, in a "Temple of Industry," erected in the Champ de Mars. It was open three days and had 110 exhibitors. Here the jury system of awarding premiums was instituted. Others were held in 1801, 1802, and 1806, after which there was a cessation until 1819. The fair then held, in the Court of the Louvre, continued open 35 days, had 1662 exhibitors, and issued 809 medals and rewards. After 1820 the idea was generally taken up by other countries, and between that date and 1850 national exhibitions were held in nearly every country of Europe, and at New York and Washington in the United States. They were continued in Paris at periods averaging five years until 1849, in the exhibition of which year the number of jurymen had increased from the original 9 to 64, the space occupied to 240,000 square feet, the period of the display to 56 days, and the number of exhibitors to 4494.

In England, during this interval, many civic exhibitions were held, but no really national ones, though that of Birmingham in 1849 approached most nearly to national importance. The first English national exhibition was projected by Prince Albert, to be held in 1851. But this enterprise rapidly expanded in the minds of its managers until the international idea was broached, and it became the first "World's Fair," the renowned "Crystal Palace" exhibition, held in the famous temple of glass, the magnificent architectural device of Joseph Paxton. This grandly beautiful edifice was 1848 feet long by 408 wide, with a floor area of 989,884 square feet, and was filled with a splendid display of the products of the whole civilized world, the 7381 exhibitors from England and her colonies being nearly matched by 6556 from the rest of the world. Unlike all later World's Fairs it was a financial success. The exhibits were arranged under 30 heads, of which we may note that one only was devoted to the fine arts. Later exhibitions have devoted far more attention to this subject, and also to the liberal arts and to agricultural products.

The second international exhibition was that of New York in 1853. This was on a much smaller scale than that of London, the building covering 4¾ acres of floor space. The European part of the display was of minor value, but on the other hand here was the first really great exhibit of American products. There followed a large crop of exhibitions in many parts of the world, most of them incorrectly called international. Those which could fairly claim this title were held at Paris in 1855, at London in 1862, at Paris again in 1867, and at Vienna in 1873. The latter two were of great extent and importance, the former claiming the great number of 50,226 exhibitors, while in both the classification and arrangement were superior to those of any previous exhibitions. That of Paris, indeed, arranged in concentric ovals and radii, so that each country had its exhibit consecutively displayed, while each class of exhibits ran through an unbroken oval space, was the most systematic arrangement of a great exhibition ever made.

The international exhibition which next succeeded is one to which we owe a more detailed attention than we have been able to give to those above mentioned. This was the notable and highly important "Centennial Exposition of the World's Industries," held at Philadelphia in 1876, to commemorate the hundredth anniversary of American independence. The history of the United States contains no event of more interest and importance, and none of more value to the American people, since its usefulness as an evidence of the extraordinary development of American industries was surpassed by its utility in opening the eyes of our people to the condition of the arts and industries in foreign lands. Though, in common with nearly every other world's fair, it proved financially a failure, yet in every other respect it was a grand success, and as a lesson to the people of America, and an incitement to them to enter into industrial and artistic rivalry with the world at large, its value can hardly be estimated. We can only say that the ten years which have succeeded have been the ten great years of American progress, as so far achieved, and that the breadth of development within these ten years must be in considerable measure ascribed to the influence of the Centennial Exposition.

This magnificent display of the world's products was held in Fairmount Park, Philadelphia, on a large level area, of some 260 acres in extent, to the west of the Schuylkill River. Within this enclosed area were two wooded and picturesque ravines, which, with the neighboring elevation of George's Hill, added greatly to the beauty of the situation. The level space was occupied by a very considerable number and variety of buildings, comprising, in addition to the principal exhibition structures, handsome edifices, erected by many of the States of the Union and by the commissioners of foreign countries, together with many edifices of a minor character. Of these buildings those erected by the Board of Finance were 45 in number; by private exhibitors, 56; by the United States government, 7; by the several States, 24, and by foreign governments 15, making a grand total of 147. The edifices more particularly devoted to the exhibition were 5 in number: the Main Building, Machinery Hall, Memorial Hall, Horticultural Hall, and Agricultural Hall, though two additional edifices, the Government Building and the Woman's Pavilion, added materially to the value of the display, while several of the State edifices contained highly interesting exhibits of special State products.

Of these edifices the Main Building was an enormous structure, 1880 feet long by 464 wide, with a floor area of 20.02 acres. The interior height was 70 feet, with towers at the corners and in the centre of 120 feet in height. It was built of wrought-iron columns supporting wrought-iron roof-trusses, the sides being of glazed sashes resting on brick walls. Interiorly it presented one main avenue, 1832 feet long by 120 wide, the longest of that width ever seen in an exhibition building; with two side avenues of the same length and 100 feet wide. These were crossed by transverse avenues, while the centre of the building presented an immense open space, on which faced the displays of the most important exhibiting nations, Germany, France, England, and the United States. The total space occupied by exhibitors in this building was 682,080 square feet, of which the United States occupied 309,973 and foreign countries the remainder.

Of the other principal buildings Machinery Hall was 1402 by 360 feet in extent, with 15 acres of exhibiting space, while Agricultural Hall had a floor area of 10¼ acres. The total area of floor space in the principal exhibition buildings was about 50 acres. The two remaining chief buildings, the massive and imposing stone structure of Memorial Hall, and the airy Horticultural Hall, built of glass and iron in the picturesque Moorish style of architecture, were intended as permanent edifices, and still remain on the ground. In addition may be named the United States Government building, with its unprecedented display of objects pertaining to the government service in its various departments; and the Woman's Pavilion, the first isolated exhibit of woman's work ever made at a world's fair.

The first step towards the establishment of the Centennial Exposition was made by Congress in an act passed on March 3, 1871, which created the "United States Centennial Commission." A subsequent act, passed June 1, 1872, established the "Centennial Board of Finance," with an authorized capital of $10,000,000. Of these two bodies Hon. Joseph R. Hawley was made president, and Gen. Alfred T. Goshorn director-general, of the Centennial Commission, while the Board of Finance, the working body to which the success of the enterprise was mainly due, was organized under the presidency of Mr. John Welsh. By an act passed June 5, 1874, an invitation to participate in the exhibition was extended to foreign governments. This invitation was responded to by 36 separate nations, the acceptance by Great Britain including Canada and 18 other colonies. The expenses of the exhibition were in great part provided for by contributions from the citizens and corporations of Philadelphia and its vicinity, and by grants of funds from the city council and the Pennsylvania legislature, the million and a half loaned by the general government being made a preferred debt, which was paid back out of the proceeds of the enterprise.

Two important questions called for decision prior to the opening of this exhibition, that of the system of awards, and that of the method of classification. The principle adopted by previous exhibitions, of giving prizes and medals of graduated value to exhibitors, had never proved satisfactory in its operation, and it was decided on this occasion to give to all successful competitors a uniform bronze medal, with a certified copy of the special report of the judges. The classification finally adopted divided the exhibits into seven grand classes, three of which, *Mining and Metallurgy*, *Manufactures*, and *Education and Science*, were displayed in the Main Building, while *Art* occupied Memorial Hall and its annex, and *Machinery*, *Agriculture*, and *Horticulture* were arranged in the buildings of these respective titles. These seven classes were subdivided into 739 sub-classes, the whole system constituting a partly successful effort to systematically distribute the multiform articles of human production. The character of the buildings, however, with the necessity of giving a connected space in each edifice to the exhibit of each country, prevented any connected grouping of similar products, like that achieved in the Paris exhibition of 1867. This discordance between the claims of nations and of products causes a certain lack of continuity in all general exhibitions which it is very difficult to obviate.

All preliminaries having been arranged the exhibition opened on May 10, 1876, with all its debts paid or provided for, and with a display of the products of the nations of the world which has never been surpassed in magnificence, beauty, variety, or value. Of the several nations exhibiting the United States occupied a space of more than 1,000,000 square feet; Great Britain with its colonies more than 200,000; France and its colonies nearly 100,000; Germany over 60,000; and the other nations in diminishing ratio. It must be said, however, that the interest and value of each national display were by no means governed by the space occupied, and that the novelty of the articles shown by several of the minor nations proved more attractive than the extensive exhibit of some of the larger nations. Undoubtedly of the highest value to the citizens of the United States was the exhibit of art, particularly as applied to articles of ordinary use. In regard to mechanical products America had little to learn. In regard to art it lay very considerably below the level of many European nations. And probably the most important result of the Centennial Exposition has been the awakening of the American people to a realization of their lack in this particular, and the very rapid advance in the fine arts and the artistic adornment of articles of utility which has taken place since its date.

The exhibitors in all numbered about 40,000. This is considerably below the estimate given for the preceding exhibitions at Paris and Vienna. But the discrepancy is mainly due to the adoption of a just system of numeration in the later case, the numbers being unduly magnified in the former instances. The exhibition was opened to the public 159 days in all, being closed on Sundays. The total attendance of visitors, pay and free, was 9,910,966. Of these the greatest number of admissions on any one day was 274,919. This was on September 28, "Pennsylvania day," and was probably the greatest number which ever visited an exhibition on a single day on which an admission fee was charged. The means of reaching the exhibition were ample except for the most extraordinary occasions, the estimated transportation capacity from the city being 21,930 persons hourly. On Pennsylvania day the two railroads to the grounds carried 261,213 arriving and departing persons. It is impossible here to refer to any of the minor particulars of this exhibition, or even to name its more notable features. It has left a record of permanent value to the city of Philadelphia, in the massive edifice of Memorial Hall, with its highly useful museum of industrial art; and in the ornate and beautiful Horticultural Hall, with its no less useful display of exotic plants. The city of Washington has equally benefited. At the close of the exhibition the highly interesting display made by the United States government was added to by the gift of the governmental exhibits of no less than 34 nations, a quantity sufficient to fill 60 large freight cars. Nearly as much more was added at the close of the permanent exhibition, and by the gift of the collection of the Institute of Mining Engineers. These constituted the nucleus of the National Museum at Washington, and led to the erection of a spacious museum building for their display, and for the reception of the Smithsonian and other government collections. As to the cash results of this exhibition the amount received from visitors was $3,814,694. Proceeds from other sources swelled this sum to about $4,300,000. This was considerably beyond the sum received at previous exhibitions, the sum taken at the gates at Paris in 1867 being $2,203,675, and at Vienna in 1873, £206,477. Yet it was very considerably below the sum of the expenses. The Main Building was kept open for several years afterwards as a permanent exhibition. But this enterprise failed to pay and was finally closed.

The next succeeding International Exhibition, that of Paris in 1878, surpassed all preceding efforts in hugeness, the buildings covering about 80 acres, and the exhibitors being estimated at over 80,000. The admissions to this exhibition reached the grand total of 16,032,725, while the gross receipts amounted to 12,653,746 francs. Its most notable points of excellence lay in its display of fine arts and literature and its exhibits of national institutions.

The latest of International Expositions, that of New Orleans, is of special interest as an enterprise of our Southern States, and as indicative of the growing energy and industry of the people of the South. The first movement towards an exhibition of Southern products was made at Atlanta, Ga., and gave rise to the "International Cotton Exposition," held in Oglethorpe Park, near that city, from Oct. 5 to Dec. 31, 1881. It failed to attract any important foreign exhibits, but offered a highly interesting display of Southern products, by no means confined to cotton, but covering every field of industry. The main building was built of heavy timber, in the shape of a cross, whose arms were 720 feet long by 400 wide. The exhibitors were over 1800 in number, and the number of visitors 286,895.

This was followed by the "Southern Exposition," held at Louisville, for 100 days from Aug. 1, 1883. In this the main building covered 13 acres and cost $300,000. There were 1500 exhibitors, and a total admission of 770,048.

These movements were preliminary to a general World's Fair in the South. In October, 1882, the National Cotton Planters' Association resolved to hold an exhibition in New Orleans in 1884, to celebrate the centenary of the cotton industry of the country—the first record of American cotton in commerce having been made in 1784, when 6 bags (about 1 bale) were shipped from Charleston, S. C. To this project was quickly added the design of a World's Fair, of which the cotton exhibit was to be the central feature. The funds collected for this enterprise amounted to something over $600,000, with $100,000 donated by the city to build a permanent Horticultural Hall, and $1,000,000 loaned by Congress. The site selected was a tract of 245 acres known as the Upper City Park, situated on the river, about 4½ miles above Canal Street. Near the centre of this was erected an enormous Main Building constructed wholly of timber, its dimensions being 1378 by 905 feet, and the space covered 33 acres, the greatest space ever occupied by an exhibition building. It was built in a series of trussed sections, divided only by rows of tall pillars, so that the several sections constituted but one building. Its roof was largely of glass. In the centre was a Music Hall, capable of holding 11,000 persons. Next in size was the Government Building, intended to contain the exhibits of the government departments and of the several States. Its dimensions were 885 by 565 feet. In addition there was a Horticultural Hall, built of iron and glass, 600 by 100 feet, with a transept of 194 feet; an Art Building, of 250 by 100 feet; and numerous smaller structures. A special exhibit of woman's work was made in a portion of the Government Building. An interesting feature of the grounds was a garden of semi-tropical plants, comprising groves of oranges, lemons, bananas, etc.

This exhibition, known under the compound title of "The World's Industrial and Cotton Centenary Exposition," was opened on Dec. 16, 1884, and closed on May 31, 1885. Its exhibits were classed in 12 divisions, respectively: Agriculture; Horticulture; Pisciculture; Ores and Minerals; Raw and Manufactured Products; Furniture and its accessories; Textile Fabrics, Clothing, and their accessories; Industrial Arts; Alimentary Products; Education and Instruction; Works of Art; and Natural History. So far as the foreign exhibit was concerned the New Orleans Exposition lacked value, the European countries taking but little interest in it. This indifference was in part retrieved by the magnificent display made by Mexico, which occupied a floor area of 160,000 square feet, and was far the finest exhibit of its products ever made by this developing country. The departments of the United States government vied with each other in offering a handsome and illustrative exhibit, in which they were emulated by several of the States, while a highly interesting and instructive exhibit was made of the agricultural and other products of the South. The buildings have again been opened, copying the effort made after the Centennial to establish a permanent exhibition.

In all the later exhibitions there were indications that the era of the World's Fair, in its general sense, is passed, and that it will be no easy matter in the future to bring together a truly illustrative display of all the products of human industry. The perception of this gave rise in England as early as 1870 to the idea of holding fairs covering a limited field of the world's industries. Exhibitions of this character were held in London in 1871, 1872, 1873, and 1874, after which they failed to draw. Recently this idea has become general, of which we have instances in the several International Electrical Exhibitions, ending with that held in Philadelphia, under the auspices of the Franklin Institute in 1884. The idea of such limited exhibitions has been again taken up in England, with its result in the highly successful Fisheries Exhibition of 1883, and the Health Exhibition of 1884, while a special "American Exhibition" is projected for 1887. Berlin also projects a "World's Art Exposition" for the same year.

This specialization of exhibitions has been long since carried out in local displays of arts and industries, and for many years past the annual art gallery and horticultural show have been features of attraction in all our great cities. The former has been again subdivided into oil- and water-color exhibitions, etc., and a striking subdivision of the latter is shown in special exhibitions of roses, chrysanthemums, and of other attractive products of the vegetable kingdom. This specialization includes many other subjects of exhibition, one of its latest outcomes being the display of "Novelties in Machinery," held at Philadelphia in 1885.

As to the value of industrial exhibitions there can be but one verdict. They have served as one of the most important educational agencies of the present century, have taught to the people of each country the value of their home industries, and brought them into closer intimacy with each other, while stimulating them to the employment of improved methods in all industries, and to the invention of superior labor-saving machinery. The same effect has been produced upon the separate nations, their prejudices being broken down, their eyes opened to the fact that each nation is capable of teaching something to the others, and a friendly rivalry in invention instigated which has done much towards the progress of the world. Among the more striking instances of this effect may be mentioned the influence exerted upon England by the French exhibit in the 1851 World's Fair. The highly artistic finish of the French goods was in such marked contrast to the utilitarian baldness of those of England that the latter country was stirred into a fever of competition. The arts of design were everywhere studied, the South Kensington Art School established, and the application of the fine arts to industry received a stimulus which has revolutionized the industries of England in this particular. A somewhat similar result followed the display of European art at the Centennial Exposition of 1876. The deficiencies of the United States in this particular were so evident, and the eyes of its people so opened to the superiority of European art products, that in the years which have since elapsed there has been a virtual art renaissance on the American soil, and in the field of the artistic adornment of industrial products we are very far in advance of our position of ten years ago. In return America has taught Europe some highly useful lessons; and, taken as a whole, the industrial exhibition has been one of the most potent educating, stimulating, and civilizing of the institutions of the age. (C. M.)

INFANTRY, American. The company is the unit of army organization. For it the war basis is 100 men. Its immediate commander, corresponding to the Roman centurion, is denominated captain. For the peace basis, under the law, each company embraces 1 captain, 1 first lieutenant, 1 second lieutenant, 5 sergeants, 4 corporals, 2 musicians, 1 wagoner, 2 artificers, and 50 private soldiers. The number of privates may be increased at the discretion of the president, not to exceed 100, when the exigencies of service require such increase.

Men are recruited for the army by commissioned officers, who are detailed as "recruiting officers." They have stations in large cities and military posts. Recruits must be effective and able-bodied men, and before being accepted and enlisted pass a physical examination. They must be between 16 and 35 years at first enlistment; but soldiers can re-enlist as long as capable of performing military duty. Minors having parents or guardians must receive written permission from them before being enlisted; further, no insane or intoxicated person, nor deserter from the military service, or person convicted of criminal offence (felony) shall be enlisted. The enlistment is for a term of five years.

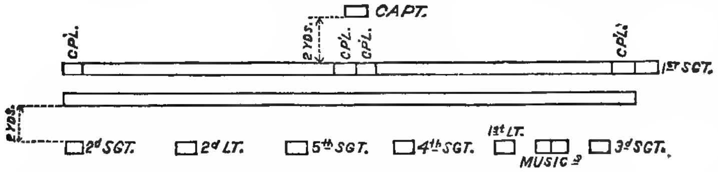


Fig. 1.

The company is habitually formed in line, in double rank, the front and rear. The rear-rank men cover the men in the front rank, and are at facing-distance from them. Two yards behind them is another rank called the line of file-closers, in which are habitually found the lieutenants and sergeants when the company is in line (Fig. 1).

When large the company is divided into two equal parts called platoons, each platoon being commanded by a lieutenant. The men are arranged according to height, with corporals in the front rank, and on the right and left of platoons. When the companies are small the division into platoons is omitted, and the corporals are placed on the right and left of the company. In succession, commencing on the right, the men count fours, *i. e.*, calling off the whole numbers, 1 2 3 4, 1 2 3 4, and a set of fours is the unit of the company manœuvres.

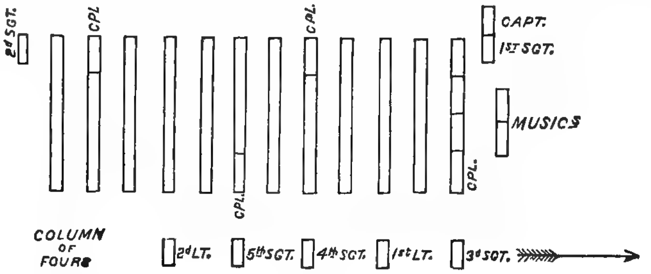


Fig. 2.

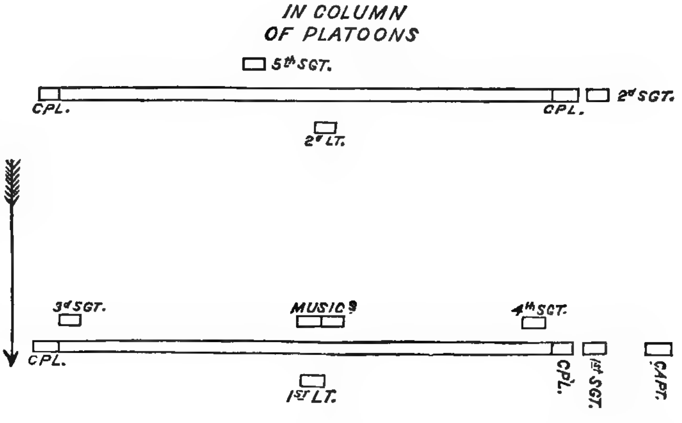


Fig. 3.

The U. S. army is now organized on a peace footing; the companies seldom have more than 48 enlisted men on their rolls, including sergeants and corporals only, and usually from 16 to 35 privates for duty. With these small companies only one rank is employed, giving what is technically called a "single-rank formation." This gives the company about twice the front it would have if the ordinary double rank were used.

The company is marched in line or in column. It may be in column of fours or of platoons. The position of officers and men in column is shown by the Figures 2 and 3.

Ten of the companies so described constitute a regiment, which is the unit of army administration. The regimental commander is denominated a colonel. The complete regimental organization consists of a colonel, 1 lieutenant-colonel, 1 major, the adjutant, the quartermaster, and the ten companies before described, the sergeant-major, the quartermaster-sergeant, chief musician, and 2 principal musicians. The adjutant is appointed by the regimental commander, and he nominates the regimental quartermaster to the secretary of war for appointment if approved. There are 23 "white" and 2 "colored" regiments in the infantry of the U. S. army. In the "colored" regiments a chaplain is part of the regimental organization, and has the rank of captain; but he cannot take command of troops. The colonel, lieutenant-colonel, major, adjutant, quartermaster, captains, chaplains, and the lieutenants are "commissioned officers"—commissioned by the President and confirmed by the Senate. The various sergeants and corporals are "non-commissioned officers," and derive their authority by warrants, which are signed by the regimental commander and countersigned by the adjutant. The regimental commander appoints his regimental non-commissioned staff, and, upon the recommendation of the company commanders, the sergeants and corporals of companies, and issues the warrants of their rank. A first sergeant is selected by the company commander from among his sergeants, and may be reduced to a duty sergeant without reference to other authority.

The commissioned officers hold their positions for life, unless dismissed by the President for cause. At 64 years of age they are retired from active service and receive three-fourths of their regular pay.

On the organization of a regiment the companies are permanently designated by the letters in alphabetical order, J being omitted. Officers in the first instance are assigned to these subdivisions, and afterwards succeed thereto, as promoted to fill vacancies.

A regiment, or any part of it composed of two or more companies is, in all tactical arrangements, designated a battalion. For manœuvres the battalion is generally divided into an even number of companies, and the companies are equalized by transferring men from the larger to the smaller. Two companies form a division. In forming line the companies are so posted that senior captains may command divisions, having under them the junior captains corresponding in rank. The senior captain commands the right company, the second captain the left company, the third captain the right centre or color company. The following table shows the order of companies in line from right to left:

—	—	—	—	—	—	—	2	3	1
—	—	—	—	—	—	2	4	3	1
—	—	—	—	—	2	4	5	3	1
—	—	—	—	2	5	6	3	4	1
—	—	—	2	4	7	6	3	5	1
—	—	2	6	8	4	3	7	5	1
—	2	4	8	9	5	3	7	6	1
2	7	10	5	8	3	9	4	6	1

The habitual formation of the battalion is "in line," companies being in double rank. The field and staff officers mounted, the adjutant on foot, and the senio officer present commands the battalion (Fig. 4).

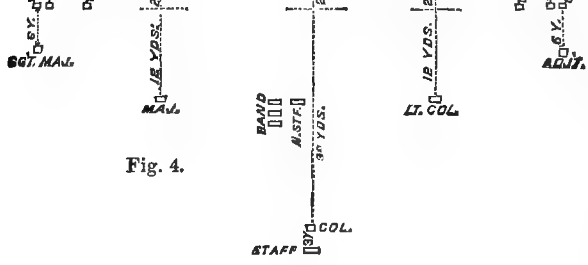


Fig. 4.

There are 2 general guides selected by the colonel from the sergeants most distinguished for carriage under arms and accuracy in marching. The general guides are posted in line of file-closers, opposite the right and left flanks of the battalion, and are designated right and left general guides.

In manœuvring, for the purpose of indicating the direction of lines of battle, the battalion is provided with 4 markers, habitually posted in line of file-closers. At parades, inspections, and musters only 2 markers are used. In forming the battalion the 2 markers are established by the adjutant and sergeant-major on the line to be occupied and the companies are conducted to the line by their captains. The color company is the first established: the companies of the right wing form successively from left to right, and in the left wing from right to left, being brought up to the line by their captains in the order designated.

In the American infantry there is now, properly speaking, but one battalion of infantry. In most European armies the infantry arm has three battalions for each regiment. There is an earnest desire on the part of the infantry officers to secure the same three-battalion order for the United States. The U. S. Senate has now an excellent bill before it, which proposes the change, and calls for two additional companies, with their complement of officers, non-commissioned officers and privates, and two additional majors. For war the proposed regiments will have 1200, for peace 600 private soldiers.

In each regiment there is also a color-guard, composed of a color-sergeant and 7 corporals—it is posted as the left four of the right-centre company. This guard is selected from those non-commissioned officers most distinguished for bravery and for precision under arms and in marching. The color-sergeant carries the national colors. The regimental colors, when present, is carried by a sergeant who takes the place of the corporal on the left of the color-sergeant.

Bands.—When it is desired to have bands of music for regiments there are allowed for each 1 sergeant and 16 privates to act as musicians, in addition to the chief musicians authorized by law, provided the total number of privates in the regiment, including the band, does not exceed the legal number.

Formations.—At present with the small companies the battalion at drills and other exercises is formed in single rank. The battalion may also be formed in column of fours, of platoons, of companies, or of divisions. The column of companies or divisions may be "close" or at full wheeling distance; close column having 6 yards between subdivisions. Close column is used in rapid concentration and deployment of troops, but is objectionable when under fire.

Arms and Equipments.—Each enlisted man is armed with a breech-loading rifle of the Springfield pattern, and has for equipment a waist-belt, on which is slung a bayonet scabbard and cartridge-box, one canteen for water, one haversack containing knife, fork, spoon, and meat-can. A quart tin-cup is tied to outside of haversack. There is also a blanket-bag to contain the soldier's change of clothes and extra pair of shoes, and on the outside of this bag are strapped the two blankets and one piece of the shelter-tent. The sergeants, in addition, wear a 45-calibre Colt revolver. A woven web-cartridge waist-belt of dark brown color is issued by the government for field use. It has sixty vertical loops around it, into each of which a metallic cartridge fits, the rim of the cartridge hindering it from slipping through the loops. The bayonet has the usual short-pointed blade with three grooves, its cross-section being During the civil war of the United States a trowel-bayonet was in use. It was in shape a stiff narrow shovel, and was used in making rifle-pits when other intrenching tools were not at hand. There are many of these bayonets in store but they are not now issued.

Whenever practicable, baggage transportation, either by wagons or pack-animals, is furnished to infantry in the field. When transportation is furnished, rations are not carried by the soldier; and on arriving in camp the cooks of each company prepare the food; bread being baked in field-ovens; coffee and soup prepared in camp-kettles. The rations for 100 soldiers for one day are: Bacon in sacks, 75 lbs. net, 76 lbs. gross; fresh beef or mutton, 125 lbs.; hard bread, 100 lbs. net, 132 lbs. gross; beans in sacks, 15 lbs. net, 15.30 lbs. gross, or rice, 10 lbs. net, 10.20 lbs. gross; coffee, green, 10 lbs. net, 10.20 lbs. gross, or coffee roasted and ground 8 lbs. net, 8.20 lbs. gross; sugar, 15 lbs. net, 15.30 lbs. gross; vinegar (1 gal.), 8 lbs. net, 9.50 lbs. gross; candles, 1.50 lbs. net, 1.75 lbs. gross; soap, 4 lbs. net, 4.55 lbs. gross; salt, 4 lbs. net, 4.50 lbs. gross; pepper, .25 lbs. net, .46 lbs. gross.

A soldier can carry in his haversack from one to five days' rations, consisting of bacon, hard bread, coffee, roasted and ground, sugar, and some salt and pepper. Sometimes a little rice or beans is added. Besides this each soldier carries one overcoat, one piece shelter-tent, 50 rounds ammunition, the total weighing 15 lbs. 15 ozs. Ordinarily the bayonet is not carried in the field, and the web-belt is used for carrying the ammunition.

The weight of a soldier's equipments, which are issued by the ordnance department of the army, is as follows:

Springfield rifle without bayonet, 9.15 lbs.; Colt's revolver, 2.37; gun sling, .25; tin cup, .525; meat can, .088; knife, fork, and spoon, .390; haversack and strap, 1.425; canteen filled and strap, .425; 1 round rifle ammunition, model 81, .107; 1 round revolver ammunition, model 82, .046; total, 17.610 lbs.

The quartermaster's department issues the following articles, which are also carried by the soldier:

One piece shelter-tent, 2.2 lbs.; 1 blanket, 5.4; 1 overcoat, 8.8; 1 blouse, 2.0; 1 pair shoes, 2.15; 1 pair drawers, 12½ ozs.; 1 pair stockings, 4 ozs.; 1 blue shirt, 1 lb. 2 ozs.

Two pieces of shelter-tent button together, affording good protection to two men. The following extract from Circular 23, Department of Missouri, Oct. 31, 1885, shows weights of articles for field-service taken with an infantry company of 43 men, for an absence of 20 days:

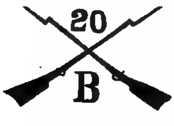
Field-rations, 2317.44 lbs.; ammunition, 100 rounds per man, 500; officers' baggage and supplies, 150 lbs. for company commander (100 lbs. for each subaltern), 350; tentage (wall tent, 109 lbs.; common tent, 45), 154.43; grain for 6 animals, 360; utensils for company mess, 100; horse-shoes, nails, etc., soldier's baggage, each having 2 blankets, 1 piece shelter-tent, 1 pair drawers, 1 pair stockings, and 1 shirt, 635.54; total, 4417.46 lbs., packed in 1 six-mule wagon.

Load for packs, 10 days: field-rations, 10 days, 1131.77 lbs.; ammunition, 100 rounds, 500; utensils for company mess, 50; total, 1681.77 lbs., making 280.29 lbs. to each pack animal.

With each detachment are also carried in the wagon at least 1 axe and helve, 5 lbs. 11 ozs.; 1 shovel, 4 lbs. 14 ozs.; 1 spade, 5 lbs.; 1 hatchet, 1 lb. 7 ozs.; 1 water-bucket (iron), 5 lbs. 2½ ozs.; 1 pick-axe, 9 lbs. 6 ozs.; 1 mess-pan, 1 lb. 13 ozs.; 1 frying-pan, 3 lbs. 1 oz.; 1 camp kettle, 3 lbs. 11 ozs.; 1 set horse-shoes and nails, 3 lbs. 9 ozs.

Weight of army wagon complete, including cover, bows, double and single trees, and fifth chains, 1840 lbs.; 1 extra wagon tongue, 50; 1 extra coupling pole, 34; 1 set six-mule harness complete, including neck straps, chains, and saddle, 227 lbs. *Extras*, 1 zinc bucket, 12 open links, 12 hane straps, 2 cans axle grease, 1 curry-comb and brush, and ½ buck-skin, 15 lbs.; total, 2166 lbs.

The Uniform.—The color of the uniform is blue with white trimmings. The overcoat and pants are sky-blue, the blouse and dress-uniform coat dark blue. On his forage cap are worn crossed rifles in brass, with number of regiment in upper and letter of company in lower angle, thus: The soldier belonging to Co. B. of the Twentieth regiment of infantry.



The government issues to each soldier during his five years' enlistment as follows:

Year	1	2	3	4	5
Helmets	1		1		
Forage caps	1	1	1	1	1
Uniform coats	1	1		1	
Trowsers	3	2	3	2	2
Dark-blue flannel shirts	3	2	2	2	2
Knit under-shirts	3	3	3	3	3
Drawers	3	3	3	3	3
Post shoes	1	1	1	1	1
Field or camp shoes	2	1	2	1	1
Stockings, woollen	4	4	4	4	4
Stockings, cotton	2	2	2	2	2
Blouses	1	1	1	1	1
Overcoat	1				
Blankets	1		1		
White gloves, pairs	8	8	8	8	8
Suspenders	1	1	1	1	1
Stripes for non-commissioned officers.	3	2	3	2	2
Chevrons, cloth	2	1	1	1	1
Chevrons, gold lace for dress coat	1	1		1	
Campaign hats	1	1	1	1	1
Cork helmet in extremely hot climate	1		1		
Arctic overshoes	1		1		

Fatigue suits consisting of coats, trowsers of brown canvas, and in departments of Dakota, Platte, and Columbia, on account of the cold, one hood, one pair of mittens; coat and trowsers are issued by the quartermaster's department free of charge at the rate of one suit per year. Fur hats and gauntlets are sold to soldiers, one pair per year. Fur overcoats are issued to troops in cold climates while they are on guard and escort duty.

The money value of clothing for each year:

Year	1	2	3	4	5
First sergeants	$59.13	$37.23	$36.14	$37.23	$25.91
Duty sergeants	57.67	36.14	35.77	36.14	25.55
Corporals	56.58	35.04	35.40	35.04	25.18
Musicians	55.12	33.58	35.77	33.58	25.18
Artificers and privates	53.66	32.48	35.04	32.48	24.82

Pay—The pay of the soldier per month is as follows:

Year	1	2	3	4	5
First sergeants.	$22	$22	$23	$24	$25
Sergeants	17	17	18	19	20
Corporals	15	15	16	17	18
Artificers	15	15			
Wagoners	14	14	14	15	16
Privates	13	13	14	15	16

For pay of officers see Vol. I., p. 317.

The Brigade.—In the U. S. army a brigade is usually composed of 4 battalions or regiments, and is commanded by a brigadier-general. At parades, reviews, and other ceremonies, the regiments are posted in line from right to left, according to the rank of their colonels, the senior colonel on the right. On other occasions the regiments are posted at discretion of the general. For evolutions the intervals between battalion is 24 yards; in battle it may be reduced to 6 yards. In time of peace, army, brigade, division, and corps will not be formed.

In line-of-battle, composed of several brigades, the brigadier-generals are about 70 yards in rear of the centre of their brigade. The general is attended by his personal staff; the adjutant-general rides on his left, his aides-de-camp in rear, the senior on the right. On the march the remaining members of the staff march according to rank in rear of the aides-de-camp, the senior of each rank on the right.

Any organization above a brigade, in general, combines in it artillery and cavalry. The *army division* has, however, usually infantry and artillery, while the *army corps*, consisting of two or three *army divisions*, is never complete without all arms of the service. The proper proportion of infantry to the other arms is about 2 to 1. For example: a corps of 21,000, all told, should have 14,000 infantry, 6000 cavalry, and 1000 artillery. The usual peace arrangement gives for officers and men, 13,525 infantry, 8410 cavalry, 2930 artillery. In the artillery all troops, except those serving in the 5 light batteries, are armed, drilled, and equipped as infantry.

Frequently, during the Indian wars, as in the Nez Percé war of 1877, and in the *Piute and Bannock* war of 1878 several companies of infantry regiments were temporarily mounted on ponies. The companies so used were called "mounted infantry."

By the introduction of an extensive system of target practice the infantry soldier is fast becoming a skilled marksman, officers and men using their rifles with rapidity and accuracy of fire and estimating distances with a precision hardly hoped for a few years ago.

Skirmishing.—The skirmishing order is used more generally now in extensive operations than ever before. This order consists in an arrangement of soldiers in a long line with intervals, more or less extended, between the individual men. This arrangement is used with a view to present fewer men in a given space, and thereby incur less danger from a hostile fire than would be caused to the same command with closed intervals. By this means the soldiers generally gain more advantage from cover because their field of action is larger.

In war the skirmishers are used to search out the presence of the enemy previous to attack, and to let his secret approach be known. They are now used for false attacks and often for real attacks, when the points chosen will admit of it. Their office of guarding the flanks and fronts of a command and resisting the approach of the enemy is well fixed. They are, what may be called, the pulse of an army, indicating, as they do, the movement of the main body. The introduction of breech-loading arms has increased the usefulness of the skirmish order for both offensive and defensive operations.

In this order the company is the unit. First form the company in line; the men can then be deployed towards the right, towards the left, or towards the right and left. It, in this way, may be deployed towards the front, occupying a position as skirmishers in advance of that held in close formation, or it may be deployed to occupy the prolongation of its position.

For example, giving the command: "As skirmishers on the right-four, take intervals, march." The *right-four* move to the front, the other fours make a wheel, so as to gain ground to the left, and, regulated by number, 4 take intervals from number 4 of the 4 next on their right, so that when the command "halt" is given, numbers *one*, *two*, and *three* can move off and deploy on each number 4, with the stated interval. This interval is usually 40 yards, between the numbers 4; this will give 5 yards between the skirmishers.

In a similar way, by changing the command, the skirmish line may also be formed on the left 4 or on the centre 4. The deployed line can, by proper commands, be moved in advance, in retreat, or by both flanks. It can also be wheeled in a circular movement by facing one wing to the rear, and moving around on its centre as on a pivot (Fig. 5).

In skirmish exercises the men carry arms at will, and so take ground that the even numbers fire while the odd are making ready. Besides the front movement, the deployment can be made by the right and left flanks; that is, the line may be extended by opening the intervals to the right or to the left, or to the

In order to deploy a regiment as skirmishers, certain companies are designated and withdrawn for a reserve. The battalion (*i. e.*, the regiment in movement) may be in line or in column. If in line the company designated as the basis for deployment extends its intervals at once, that is, deploys; while the companies to its right and left move off in close order in the proper direction. They themselves deploy when they have each attained their designated interval.

When the command is in column the leading or designated company deploys into a skirmish line, while the other companies are moving into position, each of which then makes its own deployment.

Target Skirmishing.—For actual work certain figures or images, usually made of iron, about the size of men, are set up a yard apart. They represent men standing, kneeling, and lying down. The company, in skirmish order, is drawn up facing these figures. As the line is advancing the halt is sounded. Instantly the men adjust their sights and get into position. After 6 seconds from the halt "commence firing" is sounded by the bugle. The skirmishers fire as rapidly as practicable for 15 seconds, then the command "cease firing" is given. Any soldier who fires before or after the signal must lose 5 points in his merit count. The advancing line makes 5 such halts and firings. The retreat then follows with 5 halts. The distances in range are from 600 to 200 yards. For competition drills 40 cartridges are allowed to each skirmisher. Some who can fire rapidly and accurately expend the greater part at the short ranges with better effect. The value of hits is arranged in the proportion of 3 for standing, 4 for kneeling, and 5 for lying down; that is to say, the most difficult figure to hit being placed at the highest value.

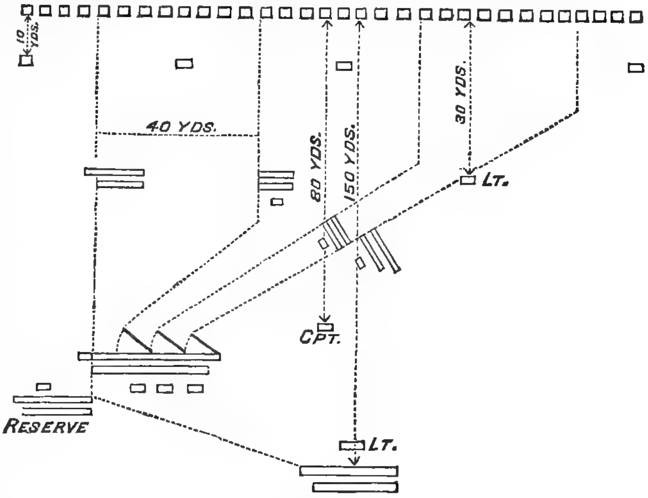
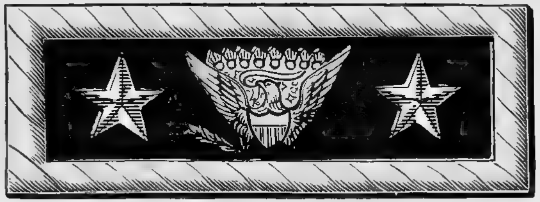


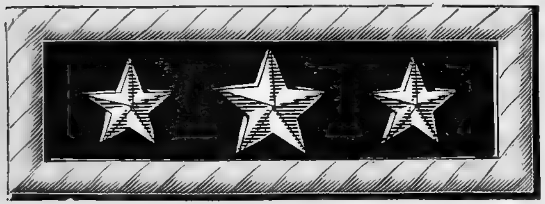
Fig. 5.

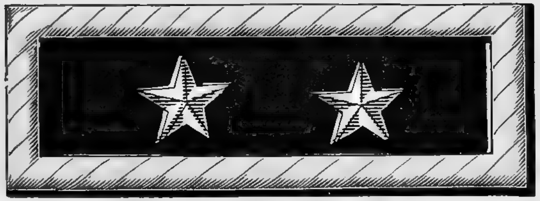
Engineers.—The engineers of the United States army form a corps consisting of one brigadier-general (commanding), 6 colonels, 12 lieutenant-colonels, 24 majors, 30 captains, 26 first-lieutenants, 10 second-lieutenants, and one battalion of 5 companies of legal strength of 752 men. The ranks are not kept full. The present authorized strength is 450 men. The battalion is officered by a major, captains, and lieutenants temporarily assigned to it.

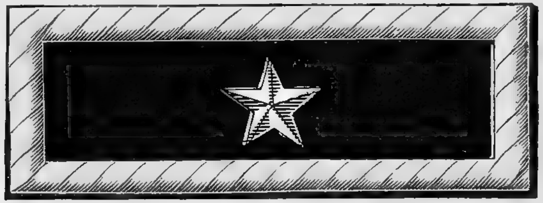
One company of this battalion is stationed at the United States Military Academy at West Point, and assists in the practical instruction of the cadets in military engineering, pontoonering, and other special field-constructions. It also does guard and other military duties at that post. The remaining companies are stationed at Willett's Point, New York Harbor, at the engineer depot and school of application. The companies at Willett's Point guard the public property

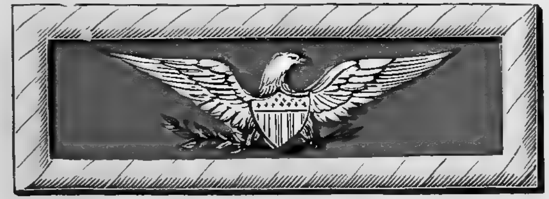
SHOULDER STRAPS
FOR
OFFICERS
OF THE
UNITED STATES
ARMY.

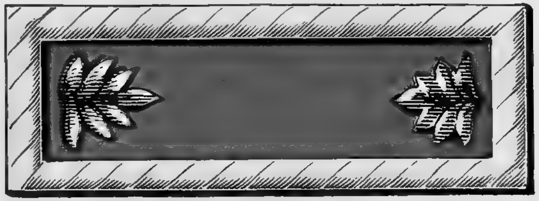

GENERAL OF ARMY.

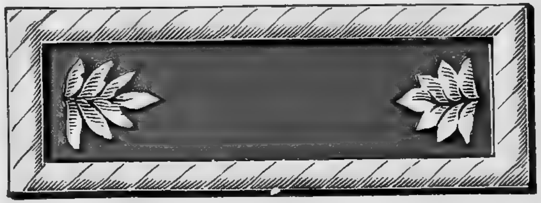

LIEUTENANT GENERAL.

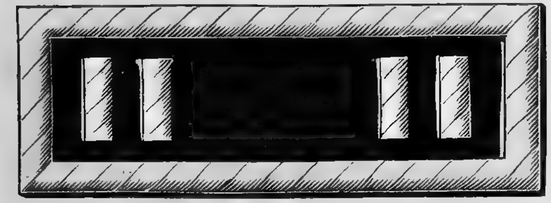

MAJOR GENERAL.

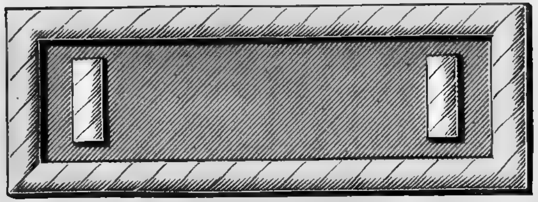

BRIGADIER GENERAL.

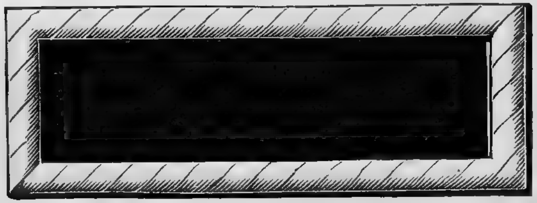

COLONEL.


LIEUTENANT COLONEL (Silver Leaves).


MAJOR (Gold Leaves).


CAPTAIN.


FIRST LIEUTENANT.


SECOND LIEUTENANT.

For Generals and Staff Officers on Dark Blue Cloth.
' Officers of Artillery on Red Cloth.

For Officers of Cavalry on Yellow Cloth.
Infantry on Light Blue Cloth.

explosives, and "the fish-torpedoes" and other matters connected with the development of submarine mining service, remodel pontoon trains, print confidential documents, and do other like duty. They are drilled and equipped as infantry, besides being instructed in the duties pertaining to their own arm, namely, sapping, mining, pontooneering, military map-making, and submarine mining for the defence of coasts.

The engineer officers, the greater part of whom are not on duty with the battalion, are employed, during peace, in planning and building permanent fortifications, and also in constructing a great variety of civil works carried on by the general government, such as the improvement of harbors and navigable rivers, building light-houses, constructing public buildings, the care of the public grounds at Washington, the erection of national monuments, making geographical surveys, and completing roads and bridges for the National Park.

The more experienced officers are placed on boards to project works at important localities, and in their individual capacities to supervise the constructions and improvements, and make disbursements of money therefor throughout extensive districts. The younger officers are assigned as assistants on the various works to exercise local supervision and make themselves familiar with both theory and practice by special reading and experience in the field. Promotion is by seniority, and all engineer officers are retired from active service on reaching the age of 64 years. Vacancies in the grade of second lieutenants are filled by the appointment of graduates highest in class standing at the Military Academy of West Point. These lieutenants, as soon as they are commissioned, are sent to the Engineer's School of Application at Willet's Point, for a tour of not less than two years. They are attached to the engineer companies, and receive practical and theoretical instruction in the subjects heretofore mentioned as forming the duties of the battalion of engineers, and also in field-astronomy and photography. After completing this course they are assigned to duty on the staff of general officers commanding military departments, or otherwise employed on explorations and surveys. After serving about two years in this capacity, they are often made assistants to experienced officers upon civil works of internal improvement, after which they should serve in like capacity upon permanent fortifications. Owing to the accidents of the service this order of assignment cannot always be strictly adhered to. (O. O. H.)

INGELOW, Jean, an English poet, was born at Boston, Lincolnshire, in 1830. In childhood she was very reserved, but she received a good education, her father being of superior intellectual culture. Her first publication was *Tales of Orris* (1860), but her reputation was first established by a volume of *Poems* published in 1863. Among the poems which gave her fame are "High Tide on the Coast of Lincolnshire," and "Songs of Seven," the latter exhibiting seven epochs in woman's life. Other volumes of poems followed in 1867 and 1871. Her prose works include *Studies for Stories* (1864); *Stories Told to a Child* (2 series, 1866 and 1874); *Mopsa, the Fairy* (1869); *Off the Skelligs* (1872); *Fated to be Free; Sarah De Berenger; Don John.*

INGERSOLL, Charles Jared (1782–1862), an American statesman, was born at Philadelphia, Oct. 3, 1782, being the son of Judge Jared Ingersoll. He received a collegiate education, studied law, and became an attaché of Rufus King, U. S. minister to France. On his return he published *Chiomara*, a poem (1800); *Edwy and Elgiva*, a tragedy (1801); and *Inchiquin the Jesuit's Letters*, a political satire (1810). He became a member of Congress in 1813, was a supporter of the war then in progress, and declared "free ships make free goods." He was U. S. district attorney for Pennsylvania, 1815–25. In 1837 he was a member of the Pennsylvania constitutional convention, and he served again in Congress from 1841 to 1847, being a Democratic leader. When appointed by President Polk minister to France, the Senate refused to confirm him. He died at Philadelphia, Jan. 14, 1862. His most important work is a *Historical Sketch of the Second War between the United States and Great Britain* (4 vols., 1845–52). It is really a book of memoirs, strongly marked with the Democratic partisan views of the author.

INGERSOLL, Jared (1749–1822), an American statesman, was born in Connecticut in 1749. His father, bearing the same name, went to England in 1757, as commissioner for that colony, and in 1765 returned as stampmaster-general for New England. Within six weeks he was compelled by the citizens to resign. In 1770 he was appointed admiralty judge for Pennsylvania, and removed to Philadelphia. The son graduated at Yale College in 1766, and studied law in London. He then spent a year and a half in Paris, and returned to Philadelphia, where he gained high rank in his profession. He was a member of Congress 1780–81, and in 1787 was a delegate to the convention which framed the Constitution of the United States. He was twice attorney-general of Pennsylvania, and for a short time U. S. district attorney. In 1812 he was an unsuccessful candidate for vice-president on the ticket with DeWitt Clinton. He was afterwards president judge of the district court of Philadelphia. He died at Philadelphia, Oct. 31, 1822.

INGERSOLL, Joseph Reed (1786–1868), an American statesman, son of the preceding, was born at Philadelphia, June 14, 1786. He graduated at Princeton College in 1804, and practised law in Philadelphia. He served in Congress, 1835–37, and again, 1841–48, acting with the Whigs. In 1850–53 he was U. S. minister to England. He published a *Memoir of Samuel Breck* (1863), and *Secession a Folly and a Crime.* He died at Philadelphia, Feb. 20, 1868.

INGERSOLL, Robert G., an American lawyer and orator, was born at Dresden, N. Y., Aug. 11, 1833. His father was a Congregational minister, whose liberal views caused dissension among his flock, which in turn gave his sons an aversion to religion. The family moved from place to place, chiefly in Wisconsin and Illinois. Robert and his brother Eben studied law and began practice at Shawneetown, Ill., but in 1857 removed to Peoria. They took part in political discussions, and in 1860 Robert was an unsuccessful Democratic candidate for Congress. In 1862 he became colonel of the Eleventh Illinois cavalry, and in 1864 he became a Republican. In 1866 he was appointed attorney-general of Illinois. He has become noted by his public lectures in opposition to Christianity, and to the belief in God and immortality. These lectures have also been published and widely circulated.

INGLEBY, Clement Mansfield, an English critic, was born at Edgbaston, near Birmingham, Oct. 29, 1823. He graduated with mathematical honors in 1847, and was professor of logic and metaphysics at the Midland Institute from 1855 to 1858. He was made foreign secretary to the Royal Society of Literature in 1870, and afterwards vice-president. He has written several works on Shakespeare, among which are *A Complete View of the Shakespeare Controversy* (1861); *Shakespeare Hermeneutics* (1875); and *Shakespeare, the Man and the Book* (1877). His other works include *Outlines of Theoretical Logic* (1856), and *An Introduction to Metaphysics* (1869).

INGRAHAM, Duncan Nathaniel (1802–1863), an American naval officer, was born at Charleston, S. C., Dec. 6, 1802. Entering the navy as midshipman in 1812, he became a captain in September, 1855, after being somewhat noted for his conduct in the Koszta affair in July, 1853. Koszta, a Hungarian refugee, who had declared at New York his intention of becoming an

American citizen, was seized at Smyrna by the Austrian consul, but Ingraham, then commanding the sloop-of-war St. Louis, compelled the consul to give Koszta up. Congress, in August, 1854, to show its approval of Ingraham's conduct, voted him thanks and a medal. In March, 1856, he was appointed chief of the bureau of ordnance and hydrography in the navy department. In consequence of the secession of his native State he resigned his post, Feb. 4, 1861, and entering the Confederate service was made chief of ordnance, construction, and repair. He died at Charleston, June 10, 1863.

INMAN, Henry (1801–1846), an American painter, was born at Utica, N. Y., Oct. 28, 1801. He early manifested a taste for art, and having received instruction from J. W. Jarvis devoted himself to miniature and portrait painting at Boston. He removed to Philadelphia in 1832, and afterwards to Mount Holly, N. J., and to New York. Beside many excellent portraits he executed landscapes and *genre* paintings. In 1844 he visited Great Britain, and painted portraits of Macaulay, Chalmers, and other distinguished men. He died at New York, Jan. 17, 1846. His portraits include Bishops White and McIlvaine, Chief-Justice Marshall, De Witt Clinton, Martin Van Buren, Jacob Barker, and William H. Seward. His son, John O'Brien Inman, after painting portraits in the West with success, opened a studio in New York, and went to Rome in 1866. He has painted flower-pieces, landscapes, and *genre* pictures.

INNESS, George, an American painter, was born at Newburg, N. Y., May 1, 1825. He studied engraving in New York, but in 1846 began to practise as a landscape painter at Englewood, N. J. He has made several visits to Italy for observation and study, and resided there from 1871 to 1875. Among his works are Light Triumphant, Summer Afternoon, American Sunset, Joy after the Storm, Washing-day near Perugia, The After-glow, St. Peter's, Rome, from the Tiber. His pictures show the influence of Théodore Rousseau, but he is not an imitator of any one. Some of his landscapes rank among the best produced by any American artist. He is highly imaginative and impulsive, yet true to nature. His son, George Inness, Jr., has devoted himself to animal painting, and has exhibited at the National Academy with success since 1877.

INSANITY. Under this head we treat the various forms of mental defect and aberration—Idiocy, Imbecility, and Insanity as usually denoted.

See Vol. XIII. p. 101 Am. ed. (p. 95 Edin. ed.).

I. Idiocy.—The report of the U. S. Census Commission for 1880 shows that the idiot population was 76,895, which is only 5102 less than the insane population. The ratio of returns of idiots for 1880 shows an increase of 209 per cent. over the returns for 1870. Of this number of idiots 2429 only are in institutions for the feeble-minded. For the etiology of idiocy we refer to the Encyclopædia Britannica. Let us now take a glance at the sensory and mental deficiencies of idiots.

They appear to be deficient in tactile sensibility. It is, however, impossible to examine them accurately, as often they would not pay sufficient attention to the questions asked. This loss of sensation is often shown by their suffering injuries to their skin without noticing it, and frequently inflicting injuries upon themselves which no person with acute feeling would do. A large number of them are deficient in taste, as shown by their eating soap; and, as Ireland says, they will often chew pills in such a manner as to make one sick to look at them; they will often eat all kinds of dirt, hair, grass, etc. Ireland alludes to a case of rumination in an idiot quoted from Bourneville, on which he would eat enormously and some time afterward would be found chewing leisurely the pieces of food which he had regurgitated. A boy who is now under the care of the writer has this habit of rumination. Bourneville has recently contributed an elaborate article to this subject in which he gives many cases (see *Researches on Epilepsy, Hysteria, and Idiocy.* Paris, 1884). Ireland says the sense of smell is often defective. One boy tested by him did not appear to notice the fumes of strong liquor ammoniæ. As a general rule the sense of smell is much less often wanting than the sense of taste.

For the purpose of education, Ireland divides idiots into 5 classes:

1. Those who can neither speak nor understand speech.
2. Those who can understand a few easy words.
3. Those who can speak and can be taught to work.
4. Those who can be taught to read and write.
5. Those who can read books for themselves.

Most cases can be put under one or other of these classes. Where there is a difficulty it is generally with the third class, for some can speak who cannot be taught to work, though very few.

In the idiot the evolution of the senses is slow. They do not notice and attempt to take hold of objects or smile as other children do. They do not appear to notice quickly sounds around them. The inability of certain idiots to move about has given rise to the idea that they are deficient in will-power. Ireland is not willing to accept deficient will-power as an explanation of the want of volition observed in idiots. He says: "We must first have knowledge—the knowledge of the object desired and then the desire put forward in overt exertion to obtain a known object or to change one state for another, which is quite different from the pain and pleasure obtained, when, by the execution of the will, the object is gained. The quiescence of idiocy may be owing to the want of knowledge requisite to form a definite desire."

Instances of astonishing strength of will are sometimes observed in idiots. Ireland records the case of a little girl who was very fond of pencils, and who would exert her whole muscular strength to obtain them when placed in her sight. The writer has also seen a boy at the asylum for idiots at Syracuse, N. Y., who, when an object that he desired was placed at the other end of a large room, made the most intense muscular exertion until he had traversed the entire room and obtained the object he desired.

II. Insanity.—Within recent years much has been added to the literature of insanity by numerous systematic works on the subject, published in England, France, Germany, and America; in addition many monographs on special subjects have appeared. Every author has attempted a classification of his own, each admittedly having its defects. Some have attempted a classification based upon the clinical features of the disease, others have attempted to found theirs on pathological anatomy, still others have tried a mixture of the clinical, pyschological, and pathological. At this time it is well-nigh impossible to make a classification based upon pathological anatomy. The clinical classification is the best, that of Kraft Ebing being the best yet brought forward. Many clinical groupings have now become well defined and justly take their place in any classification. We shall at once proceed to a brief description of some of these groups.

Monomania.—Esquirol introduced the name monomania as a designation for a class of insane persons who presented, as a prominent feature in their mental disorder, delusions of exaltation somewhat fixed in character. The name has since been applied to a variety of states, and undoubtedly in an incorrect manner; and this fact has led in turn to considerable confusion and the entire abandonment of the name by many authors. It is clear, however, that when properly used and restricted to a particular class of insane, the clinical features of which are quite distinct, it is perfectly proper, and is as applicable a name as any which can be applied in English. This type of insanity is recognized by the Germans under the name of *Primäre Verrucktheit*, which is equivalent to the *Monomanie* of the French.

Dagonet uses the term *Megalomanie* to designate a group of this class in which the extravagant ideas are of a socially ambitious character. The class of cases comprised under this heading have originally a defective nervous organization, a primary degenerative state, which is often characterized by abnormities in the structure of the body, such as unsymmetrical heads, abnormities of sexual apparatus, etc. The degree of these abnormities, however, differ markedly in different cases. If we can trace the family history back, many members of the family-tree will be found to have had either mental disease, epilepsy, hysteria, or other nervous disorder. These mental disturbances vary in their intensity, many of the cases passing through life entertaining delusions and manifesting peculiarities which are not sufficiently well marked to dominate their conduct in life, and which, although sufficient to render them quite different from other people, is not sufficient to prevent them from living outside of an asylum, and often to conduct a business successfully. The individual is peculiar from infancy, egotistic, has an exalted idea of his own abilities, believes he is capable of great intellectual achievements, etc. In other cases the delusions are so well marked as to control the action of the individual to such a degree that he is unfitted for private life or the carrying on of any business. One of the marked features of a large proportion of this type is the delusion of importance and greatness, while around this centre the other delusions. For instance, a woman develops the idea that she is the daughter of some wealthy and distinguished person and is the heir to a vast estate, but being really in very poor circumstances she develops the idea that some persons are depriving her of her rights and property. These delusions so control her actions that she goes about seeking to have what she believes to be her inheritance handed over to her. This behavior soon brings her to an insane asylum. She is now confirmed in her belief that she is being persecuted, and has been locked up in an asylum by her persecutors to deprive her of her social position and property. Another woman believes that she is related to Queen Victoria and is heir to the British crown, or that she is really a queen, and has been unjustly deprived of her throne and country.

In another class of cases the patients hear imaginary voices (hallucinations of hearing), persons threatening them, or accusing them of murder and other crimes, or threatening to shoot them. Upon these hallucinations of hearing develop the delusion of persecution, and later the patient reasons that he is being persecuted because he is a great man or the inheritor of large estates.

These persons will at times explain, on being questioned as to how they have become heir to estates, that they are the children of the proprietors of the estates, and were stolen from them when young. They are at times depressed by their delusion of persecution, and even at times may be violent, and are not infrequently quite dangerous lunatics. They are often quite bright, with memory perfect, and they will reason correctly and talk sensibly on subjects not connected with their delusions. They have a marked tendency, however, to revert to the subject of their delusions, and it is difficult to keep them talking of anything else, especially when the delusions have become quite fixed. For years they retain a certain amount of mental vigor, and do not pass so quickly into terminal dementia as in other forms of insanity. The condition is an unfavorable one, all these patients being incurable.

Periodic Insanity is characterized by the recurrence at intervals of separate attacks of mental disorder. Kraft Ebing places it under degenerative insanities: there being in these cases evidence of marked hereditary degeneration, as shown by abnormities in bodily structure and a bad family history. The disease is usually ushered in by some premonitory symptoms, such as slight mental depression and a feeling of discomfort and apprehension. Some grow pugnacious and irritable, find fault with those around them, and are disposed to strike others, have abnormal sensations of the skin, hyperæsthesia, formication, and a feeling as if pins or needles were pricking them. In some the attack begins suddenly. As the condition advances the attacks become more and more frequent, of greater length and greater severity. Each attack is usually the counterpart of the preceding one, the person doing the same things, using the same expressions as in former attacks. The intervals during the attacks vary in duration, but usually grow shorter as the disease advances. Mentally they appear to be sane between the attacks, but this varies very much according to different individuals.

In some cases of periodic mania the patients become excited, tearing up their clothing and bedding and breaking things around them. Others, in which the excitement is manifested by constant motion, dancing about with hair and clothing in disorder, singing and putting themselves in theatrical attitudes, constantly talking day and night until the tongue and lips become dry and parched, only eating and drinking when taken to it, still talking and gesticulating between each mouthful. Some wander about, getting into all kinds of difficulties, stealing, making indecent assaults, and indulging to excess in alcohol.

Some authors record a single morbid propensity as the prominent manifestation of a periodic insanity. The periodical melancholia is like ordinary melancholia. These are all unfavorable conditions. To make a diagnosis of these cases it is necessary to see the patient in more than one attack, or to have a complete history of former attacks.

Circular Insanity is characterized by alternating periods of melancholia and mania or mania and melancholia, with well-marked regularity in their succession, each period being entirely distinct; that is, we may have melancholia for a month, then mania for a month, or the reverse. The first description of this disorder was given by Baillarger, who called it *Folie à double forme*, and Falret, who called it *Folie circulaire.* All the cases pass from one cycle to the other without interval of sanity. In some cases where the maniacal stage, as it is called, is very mild, and is simply characterized by intellectual exaltation and abnormities in the moral sense, the behavior may lead to the belief in an intervening period of sanity.

The duration of the several periods is by no means uniform. In a few cases the patient is melancholic one day and maniacal the next. This short duration is, however, rare. In the majority of cases the periods last from several months to a year. In a case observed by the writer, the periods of melancholia and intellectual exaltation last each about four months; in another case each period lasts about one year: this latter is, however, quite unusual.

The disorder usually begins about the time of puberty, but may begin later in life, and its onset may be excited by some disease, as one of the eruptive fevers, such as measles, scarlet fever, etc., which are so common in the early periods of life. It appears to be developed mostly between 16 and 30 years of age. It is extremely rare to have the first attack later in life. All agree that it is a disorder in which a marked hereditary predisposition to nervous disorders exist, and there are cases in which more than one member of a family suffers from the same form of mental disorder.

The disease begins with either melancholia or mania; generally, however, with the former. The transition from one phase to the other varies very much; there is nothing definite about it. In some cases the transition is sudden, at times occurring at night, the patient passing suddenly from the melancholic stage to a furious maniacal stage, or the reverse. This sudden transition from one stage to the other is most apt to occur when the duration of the stages is short; that is, lasting a few days, or a few weeks, or a month. In other cases the transition is slow and gradual, a period of a week or more elapsing before the transition from one state to the other is fully established. These cases are usually observed where the periods are of long duration—six months or more.

Ritti recognizes two principal forms: 1. Melancholic state, followed by simple mental exaltation. 2. Melancholia, with delirium or stupor, followed by acute mania, delirious conceptions, incoherence, etc. But besides these we have numerous mixed cases, which cannot be classed under these two simple headings.

Symptomatology.—The period of depression can vary from a very simple mental depression to a true melancholia even with profound stupor, in which the individual sits for days in a stupid state and in one position unless moved. The patients are sad, indifferent, express ordinarily no desires, neglect their personal appearance. They desire to be alone, to keep by themselves, often retire to their rooms and remain in darkness or go to bed and remain there for days and even weeks. They have no desire for any occupation, and take no interest in anything. In other cases they are tormented by fears, believe themselves persecuted, that they are going to be poisoned, that they are damned and desire death and even seek to commit suicide. Others are sunk into a profound state of stupor. They make no effort to get food unless taken to it; if they speak—which they very frequently will not do—it is in a low, indistinct tone; the facial expression is that of sadness. Often they lose flesh and get quite thin. It occasionally occurs, however, that during this stage the patient grows quite stout. The appetite is poor, circulation defective, hands cold and blue, all the secretions diminished, the vital processes are lowered, the pulse is slow and small. This train of symptoms lasts throughout this period, and they pass off gradually or suddenly as above described to give place to the next stage.

The period of excitation varies in intensity in different cases. Ordinarily it consists in a simple over-excitation of the intellectual and moral life without marked delirium. There is a disposition to constant movement and activity. They talk incessantly, write letters without number. They go to balls, dances, and lectures. Intellectually they are active, memory often acute. They spend money freely and foolishly, engage in large business transactions or contemplate doing so, buy things they do not need and often cannot afford, thus involving their family in ruin. They are fond of dress, often wearing bouquets in their button-holes, etc., are egotistic, believe they have great ability for certain work. One thinks he is a good artist, another a good singer or superior salesman, etc. They have a disposition to take things that do not belong to them, go to excesses in drinking and venery. Some cases have hypochondriacal ideas, complain of kidney and other diseases, and want to take medicines. In other cases the patient is truly maniacal, is violent and incoherent. He may have even delirious ideas of an exalted and grandiose character, believing himself immensely wealthy and presenting in this respect many of the characteristics of dementia paralytica. Corresponding to the intellectual excitement we find all the physical processes over active. Appetite large, pulse rapid and full, respiration increased. They take little sleep, complain of insomnia, and in spite of their constant activity grow fat.

These cases are unfavorable. They pass from one cycle to another for the rest of their lives. Many of them do not undergo intellectual enfeeblement—that is, pass into a demented state—as some other forms of insanity do, but retain considerable mental vigor all their lives. Some cases are so mild as not to need asylum care.

Imperative Conceptions.—A curious grouping of mental symptoms has been described by several authors, and which can probably be classed under this head of imperative conceptions or morbid fears, although each variety has been described under a separate name. Thus Westphal has described under the name of agoraphobia a condition in which the individual has a morbid fear of certain places; under the name of claustrophobia a condition in which the individual has a fear of closed or narrow places. Dr. Beard also gave names to a variety of morbid fears. Hammond has described a state of morbid fear of defilement, pollution, contamination, under the name mysophobia. All these patients have a fear that they will be contaminated or poisoned in some way by contact with objects around them. One of Dr. Hammond's patients read in a newspaper the account of a man who had contracted small-pox by counting bank notes. As she had just previously been counting bank notes herself she began to have the idea that she was contaminated by the bank notes, and began washing her hands. A young boy coming under the observation of the writer had this idea of contamination and poisoning so strong that he would not open the front door with his hands, but knocked against it with his elbow until some one opened it. One day having spat on the carpet he rubbed it over with his shoe. He at once had the idea that the coloring from the carpet had come off on his shoe and poisoned him. One of his peculiarities was constantly washing his hands. He would do so hundreds of times a day, and if not allowed to do so was very much distressed.

These imperative conceptions are not infrequently seen among the insane in asylums manifesting themselves in a variety of ways. One has an irresistible impulse to touch every person that comes near him, is unable to explain why he does it, except that he feels that he must do so, and if he is prevented he feels very badly.

These morbid impulses often cause those possessing them to commit crimes, such as setting fire to buildings. This has been described as pyromania. Other persons have been known under these impulses to commit murder, and a variety of other morbid impulses have been described by various authors.

These imperative conceptions are evidences of a strong neuropathic taint, and are consequently unfavorable states.

Chronic Alcoholic Insanity.—Alcoholic excesses play an important part in the causation of insanity. The extensive changes which occur in the body from the constant and excessive use of alcohol, such as degeneration in the arteries and changes in the central nervous system, may give rise to an organic dementia in which the patient becomes defective in memory, irritable in disposition, indifferent to the care of his family, defective in will-power, easily influenced by others, and incapable of any decided and persistent action. He has as somatic symptoms tremor, more or less marked, most apparent in the facial muscles, tongue, and hands. He may also have anæsthesia of extremities, localized muscular cramps, and even paralysis of both lower extremities, pupillary changes and atrophy of the optic nerves. In appearance he is stupid and heavy. The mental disturbances other than the mental enfeeblement just spoken of are visions, and the hearing of imaginary voices (hallucinations of vision and hearing) of a frightful and terrifying character. He sees and hears men pursuing him, and hears them threatening to kill him; sees animals of all kinds around him, usually snakes, toads, and loathsome reptiles. These visions are always worse at night. The patient rushes about terrified and in a confused state, trying to get away from the threatening voices and visions. Under these circumstances he may do injury to those around him. A man who was arrested in New York for having been on a prolonged drunken debauch being confined in a jail suffered from marked hallucinations of vision, saw his fellow-prisoners covered with armor from which projected sharp pieces of steel, thought the floor and walls were also covered with the same, and they intended to thrust them into his body. To defend himself from this torture he drew a penknife from his pocket and stabbed another prisoner, from the effects of which he died.

In the less active cases, in addition there are in almost all the cases delusions of marital infidelity. Under these delusions a man will often treat his wife with great harshness. He murders her or the man who he supposes to have been visiting her. Chronic alcoholic cases for these reasons form one of the most dangerous class of lunatics. They more frequently perhaps than any others commit crimes.

An alcoholic for a year or two had delusions of marital infidelity, believed his last child was not his own but the offspring of another man, believed that this man visited his house at night and also in the daytime; kept a gun in his store and often threatened to shoot this man, who was a friend of his family. Although he constantly threatened he never went after the man to shoot him; but one day the man, having accidentally crossed the street to the sidewalk in front of the insane man's store, was instantly shot dead.

Syphilitic Insanity.—That syphilis plays an important part in the causation of certain mental disorders there can be now no question, and when it is considered that syphilis is a rather common disease the importance of the subject is manifest. Dowse states that of 10,000 persons under his care at the Central London Sick-Asylum three-fourths were the subjects of acquired or hereditary syphilis. It has been a matter of common observation to those treating diseases of the nervous system that when the primary and secondary manifestations of the disease are of a mild character, often so mild as not to attract attention, that the nervous system is most apt to be affected at a future time. It seems probable that those who have a peculiarly susceptible nervous system, or have by inheritance an irritable nervous system (those for instance who have or have had in their family and its branches insanity, epilepsy, hysteria), are in great danger after acquiring syphilis of having their nervous systems damaged by it, and it may manifest its evil effects five, ten, fifteen, and even twenty years after.

The changes in the nervous system found in these cases are syphilitic infiltrations of the meninges, changes in the cerebral and spinal arteries, producing a thickening in their walls, and consequent occlusion, more or less great, in their cavities. Changes in the perivascular spaces, or spaces around the blood-vessels; thickening and increase in the supporting frame work of the nervous tissue (neuroglia). All the changes above described causing disturbances in the nutrition of the nerve-tissue, either by diminution in their supply of nutrition through the blood or by direct pressure on the nerve-tissue itself, by the pressure caused by these thickenings. The most common form of mental disorder arising from these changes is a dementia, in the early stages of which there may be depressed and hypochondriacal ideas, or the patient may have a maniacal attack. Many of these cases begin by having localized paralysis, most generally of some one of the muscular groups of the eye, or they may have a paralysis of one arm; or disorders of sensibility in localized parts, such as the face, hand, or leg. Many of these cases of syphilitic dementia it is impossible to distinguish from the general paralysis of the insane, yet observation tends to prove that syphilis plays a very important and large part in the causation of general paralysis of the insane. Snell believed that 75 per cent. of the cases of general paralysis coming under his observation were due to syphilis. Mendel found that of 201 patients 117 were syphilitic.

The dementia in these cases has nothing characteristic about it; it is usually of a passive kind, without active delusions, and when they do have delusions of grandeur they are usually of a mild kind. The dementia progresses slowly and steadily; epileptiform convulsions may occur from time to time, and the final termination, if they do not die in one of these epileptiform seizures, is the same as that of general paralysis, with its extensive bed-sores, sloughing of the heels and other parts of the body, and finally death. These conditions are unfavorable.

The remedies which are successful in ordinary syphilis have no influence whatever in these cases.

Increase of Insanity.—For a number of years past there has been an evident increase of insanity, as shown by the constant overcrowding of insane asylums. Dr. D. H. Tuke, in 1878, says the increase of recognized insanity in Great Britain during the last half century has been enormous; that the great mass of this is easily explained by the attention of the public and Parliament having been directed to the care and treatment of the insane, by the consequent provision of asylums, by the low rate of mortality, and by the increased stringency of the commissioners in regard to certifying patients. Further, while the striking apparent increase which has taken place in the number of the insane is found to be among the working classes, there are manifest reasons why cases of insanity among them should have become more widely and correctly known than those among the higher classes; and why, therefore, there is actually a greater amount of insanity among the educated and wealthy than appears in the Blue-books. Lastly, looking not at the accumulation of lunatics in asylums but at the admissions, and making every possible allowance for their considerable rise beyond that of the population, it is impossible to deny that there is some real increase of occurring insanity.

In 1882 Dr. Lockhardt Robertson (*Journal Mental Science*, vol. 27) says the number of insane in England of which we have official cognizance is about 71,000, being in the ratio of 27.9 per 10,000, or 1 in 350 of the population.

By the tenth census the population of the United States in 1880 was 50,155,783, and the total insane 91,997. When comparison is made with former years the result is as follows:

Year..........	1850.	1860.	1870.	1880.
Insane........	15,610	24,642	37,432	91,997
Population...	23,191,876	31,443,321	38,558,371	50,155,783

Mr. Wines says that from 1870 to 1880 the increase in the population has been 30 per cent., but the apparent increase in the defective classes has been a little more than 155 per cent.

The following shows the number of insane to each million of the population in the United States in the census years:

Year................	1880.	1870.	1860.	1850.
Insane..............	1834	971	765	673

From the Lunacy Commissioners' report for England, made in 1885, we take the number of insane and the increase for several years between 1859 to 1885:

Year.	Total insane.	Annual increase.	Ratio to 10,000 population.
1859.	36,762	....	18.67
1860..........................	38,058	1,296	19.12
1865..........................	45,950	1,155	21.73
1870..........................	54,713	1,536	24.32
1875..........................	63,793	1,766	26.53
1880..........................	71,191	1,306	27.69
1881..........................	73,113	1,922	28.06
1882..........................	74,842	1,729	28.34
1883..........................	76,765	1,923	28.68
1884..........................	78,528	1,763	28.94
1885..........................	79,704	1,176	28.98

The above table indicates not only the gradual increase of the insane population in England but also a gradual increase in the relative proportion to the population.

According to the report for 1885 of the Lunacy Commission for Scotland it appears that between 1858 and 1885 there has been an increase in the registered insane population of from 5823 in 1858 to 10,918 in 1885. They, however, are reluctant to admit that this increase is attributable to an increase of insanity. They think the very magnitude of the increase forbids this. They say the increase in pauper patients since 1860 is enormously greater than can be accounted for by the increased population of the country.

The increase due to this cause would only be 1416, while the actual increase is 3809, or 2393 more. The natural increase in the number of pauper patients in establishments, due to the increase in population of the country since 1860, would be 916. The increase has actually been 3795, or 2879 more than is due to the increase in the general population. They argue that this increase in the proportion of mental disease it would be impossible to prove was due to an increase of insanity; on the other hand it would be impossible to disprove it. They therefore leave this actual increase unexplained.

There are many difficulties in obtaining accurate information as to the number of the insane, and this applies more strictly to the United States than Great Britain. Mr. Wines writes: "If it is simply desired to know if insanity is increasing the answer is plain. One has simply to note the growth of hospitals for the insane to keep pace with the demands for such provision. But if it is to know is there an increasing in relative proportion to the population—this is not so easily answered."

Curability of Insanity.—It has been for many years past a public belief, which has probably had its foundation in the reports of superintendents of asylums and others 40 or 50 years ago, that the large majority of those becoming insane are curable. As a matter of fact this belief is erroneous, as the curability of a case depends entirely upon the form of mental disorder, etc. Many cases are primarily incurable, such as the periodic insanities, periodic mania, circular insanity, epileptic insanity, etc.; also the insanities due to organic brain disease, and these include the general paralysis of the insane (progressive paresis, *Dementia paralytica*), of which so many cases are admitted to asylums near large cities.

The gradual diminution in the recovery rate of those admitted to asylums in the last 25 years, as compared with the previous 25 years, has attracted attention, and Dr. Pliny Earle, in 1876, in an *Essay on the Curability of Insanity*, shows most conclusively the fallacies in former statistics which brought the recovery rate up to such high figures as 80 per cent. This high rate of recovery was frequently due to the reporting as separate recoveries numerous periodic attacks in the same individual; so that in one instance 87 persons have contributed 274 recoveries to the statistics of that institution. One patient recovered 15 times, another 13 times. In another instance one woman was admitted and discharged recovered 6 times in one year. This was reported as 6 recoveries. According to Dr. Earle's researches asylum statistics were filled with recoveries of these kinds. These errors must have been due to a lack of recognition of the nature of these recurring cases, which were probably all periodic insanities; and, although the patient did recover from the given attack, the nature of the disease itself, as pointed out elsewhere, was to repeated attacks at more or less definite periods, and therefore could not fairly be put down as recoveries. Another reason for these erroneous records was probably a disposition to vie with each other in presenting high recovery rates, for then it was assumed that the percentage of reported recoveries was an evidence of the usefulness of the institution, and the idea became prevalent probably at this time that the more elaborate the institution the more patients could be cured. Dr. Earle has shown that in one instance about the year 1836 one superintendent on 23 recent admissions reported 21 recoveries, and on this he based a high percentage of recoveries, making it 92.3 per cent. This method was entirely incorrect if not unfair; but this gave an incentive to others to follow his fallacious methods. This induced another superintendent very soon after to calculate his recoveries on the number of patients discharged instead of upon those admitted. Dr. Earle concludes his paper with the following: 1. The reported recoveries from insanity (that is, 25 years ago) are increased to an important extent by repeated recoveries from the periodical or recurrent form of the disease in the same person, and, consequently, 2. The recoveries of persons are much less numerous than the recoveries of patients or cases, and, consequently, 3. From the number of reported recoveries of cases or patients it is generally impossible to ascertain the number of persons recovered. 4. The number of reported recoveries is influenced sometimes largely by the temperament of the reporter, each man having his own standard or criterion of insanity. 5. The large proportion of recoveries formerly reported were often based upon the number of patients discharged instead of the number admitted, and generally upon the results in a number of cases too small to entitle the deduction therefrom of a general formula of scientific truth, and those proportions were evidently increased by that zeal and (for want of a better word) rivalry which frequently characterizes the earlier period of a great philanthropic enterprise. 6. The assumed curability of insanity as represented by those propositions has not only not been sustained but has been practically disproved by subsequent and more extensive experience. 7. The reported proportion of recoveries of all cases received at the institutions for the insane has been constantly diminishing during a period of from 20 to 50 years. It is best for all concerned that the truth should be known as to the curability of this disease, in justice to the insane as well as those who care for them, and that the views or errors of those who cared for them 50 years ago should be corrected by the experience and advanced knowledge of the subject within recent years.

This knowledge may also lead to greater care in efforts at prevention, and thus it is to be hoped lead to a diminution in the number of those becoming insane.

Prevention of Insanity.—A physician, when consulted by an individual as to the means to be adopted by him to ward off an impending attack of insanity, finds himself confronted by one whose character, tastes, and habits are already formed and therefore now difficult to change, and, as Maudsley says: "The physician soon learns how little effect the best counsels have upon those who, having a tendency to insanity, come to him to ask what they shall do to be saved from the threatened danger; they listen attentively, assent perhaps gratefully, go their ways, and do—exactly as they did before."

Certain individuals inherit from their ancestors the predisposition to insanity, and this can often be recognized by the habits, manner, feeling, and tastes, and mode of thinking in certain individuals. "They are predestined to madness." The intermarriage of such individuals or the marriage of an individual inheriting such a neuropathic taint with another person of sickly constitution or disposed to phthisis may transmit to their offspring many miseries. Dr. Maudsley's remarks on the subject of marriages are so sensible and to the point that they must be quoted here:

> "When one considers the reckless way in which persons, whatever the defects of their mental and bodily constitution, often get married without sense of responsibility for the miseries which they entail upon those who will be the heirs of their infirmities, without regard in fact to anything but

their own present gratification, one is driven to think either that man is not the pre-eminently reasoning and moral animal which he claims to be or that there is in him an instinct which is deeper than knowledge.

"He has persuaded himself, rightly or wrongly, that in his case there is in the feeling of love between the sexes something of so sacred and mysterious a character as to justify disregard to consequences in marriage. We have only to look at the large part which love fills in novels, poetry, and painting, and to consider what a justification of unreason in life it is held to be, to realize what a hold it has on him in his present state of development, and what a repugnance there would be to quench its glow by cold words of reason. At bottom, however, there is nothing particularly holy about it; on the contrary, it is a passion which man shares with other animals."

To illustrate this subject we will take an actual case. A man who has an insane brother marries a woman who, after the birth of four children, develops a form of insanity which stamps it as hereditary. What is the prospect of these children, the descendants of such a union? Manifestly bad. If they live they will probably, one or more of them, become insane; perhaps all of them, as such instances are known. If men would stop to consider the effect upon their children they might in this way diminish the amount of insanity and the sufferings of their children.

While the hereditary influence is the most powerful predisposing cause of insanity, alcoholic excesses come next to it. Persons who have predispositions to nervous disorders should never indulge in alcoholic beverages. Alcohol may even in a healthy person produce mental disorder by its continued excessive use, but with those of an unstable nervous system it should be avoided, as on them the effect of alcoholic drinks are much worse and much more active, manifesting in them mental disturbance much more rapidly than in others.

Symptoms which may indicate impending mental disorder and upon the appearance of which the individual or friends should consult a good physician, so as to prevent the further progress of mental disorder, are disturbances of sleep, inability to sleep, much dreaming of a disagreeable or painful character or repeated night terrors, fulness and pain in head or vertigo, changes in the disposition, irritability or undue excitability, despondency, fear of impending harm, lack of interest in things and people around which formerly interested, lack of attention, indisposition, and marked indecision of character, with a feeling of uselessness and failure in life's work.

All these symptoms, when presenting themselves in an individual who previously was perfectly natural, are warnings, and steps should at once be taken to arrest them by medication or changes of scene and surroundings. One should never forget that there is a limit to constant work. There must be periods of rest, mental and physical, and this is best accomplished by sound sleep. Hard mental work never does harm provided the proper intervals of rest are taken, and it should never be lost sight of that individuals differ very much in this respect, one requiring much more sleep and rest than another.

The surroundings should be cheerful and the individual should attempt to cultivate in himself a cheerful and contented disposition. The value of nutritious food of the proper kind and taken at regular intervals is of the utmost importance. Without a proper supply of nutriment the nervous system cannot perform its functions. A large number of the persons becoming insane are found to be suffering from disorders of general nutrition. They are pale and anæmic. This is more so in women than men. A proper amount of fresh air and exercise is indispensable. Such persons should never sleep in close, badly ventilated rooms. Fresh air should always be admitted by pulling down the upper sash for an inch or two at night, and physical exercise should be moderate and steadily carried out.

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Asylums.—Every State in the Union and nearly every Territory has now one or more asylums for the insane poor. Previous to 1840 the care of this class had been left to the counties or towns only, and in the ordinary almshouses it was impossible to give the requisite attention to the occasional imbecile or insane person. The present public provision for this class is largely due to the philanthropic labors of Miss Dorothea L. Dix (*q. v.*), who about 1840 devoted herself to the task of impressing on the legislatures of the various States their duty in this regard. In prosecution of her self-imposed and self-denying labors she visited every State, conferred with the leading men and legislators in each, prepared numerous memorials and reports, and finally succeeded in having systematic provision made for the mentally defective and diseased. Appropriations were made for the erection, equipment and maintenance of asylums, and now it is universally regarded as one of the important duties of the State governments to make such provision for the insane as its wards. The private asylums have been greatly improved within recent years and are partly regulated by law and subject to State inspection.

Experience shows that too great expense has been incurred in erecting asylums. Large and high buildings, with massive walls and imposing architectural effect, are not the best adapted to the purpose. The inmates of State hospitals, who have generally been accustomed to out-door life, necessarily suffer in health from confinement in-doors. Patients of all classes should enjoy as much of the benefits of air and exercise as possible. Work-rooms ought to be abundantly provided, so that patients may be kept from brooding over their troubles. The hospitals formerly erected cost from $2000 to $5000 per patient, but the Norristown Hospital, erected in 1883 and probably the best in Pennsylvania, cost only $600 per patient, and new buildings for chronic cases have been added to the Washington National Hospital at a cost of $125 per patient.

The Lunacy Laws of all the States, as well as those of England and important portions of the laws of Continental Europe, have been gathered in a valuable work, *Legislation on Insanity* (1884), by G. L. Harrison, LL. D., late president of the board of Public Charities, of Pennsylvania. This work contains also important suggestions in regard to an evil which has on various occasions attracted the attention of the public—the possibility that, through mistakes or even intentionally, sane persons may be consigned to lunatic asylums, and under the strict regulations which have prevailed, be denied the opportunity of making known their case and obtaining a release. Of course charges of this nature have sometimes been made on false grounds, and newspapers from sensational motives have given them currency. Yet there undoubtedly have been real cases of grievous wrong. The best preventive measure seems to be to appoint special commissioners for the examination of evidences of insanity in all cases of intended detention, whether in public or in private asylums. Such commissions should be mainly composed of intelligent and conscientious laymen rather than experts, but at least one well-instructed alienist should be consulted in every case of doubt.

INSANITY, Legal Aspects of. No single definition of insanity has ever satisfied either the medical or the legal profession, and none will be attempted here. Under that term may be embraced, in law, all forms of mental defect or derangement, as idiocy, imbecility (a fatuity less than that of idiocy), lunacy, mania, monomania, melancholia, dementia, partial insanity, and many other terms used in medical science. Often no well-defined line of demarcation can be drawn between two or more of these forms in a given case. And in a great many cases there is a border of twilight, of infinite shading and degrees, between mental light and mental darkness, causing extreme perplexity in the practical administration of justice. The delirium of fever, though producing very much the same legal effects, is not called insanity. And drunkenness, producing the same inability to contract that imbecility does, is no excuse for crime. Being in itself a moral offence and a voluntary act, it is not allowed to excuse the greater crimes to which it leads. But *delirium tremens* has the legal effect of insanity as an excuse for crime. Mere weakness of mind, even approaching imbecility, is not insanity. Weak-minded persons may make contracts and wills; but less of fraud, undue influence, cunning, or inadequacy of consideration will avoid the contract or will.

It has often been said that the medical and legal definitions of insanity differ; at least that the tests of criminal responsibility and of contractual and testamentary capacity established by law are not those indicated by medical science. The controversy, so far as it is of substance and not about words, reveals the difficulty of applying a medical term or definition, or an abstract medical opinion, to the concrete facts and conduct of men in the affairs of life. Some medical writers have bitterly criticised the legal tests of responsibility and capacity, while the legal mind fears that the opinion that insanity is a disease, or the result of a physical disease, has inclined the medical mind to extend irresponsibility and incapacity too far for the ends of justice. It is immaterial to law whether insanity be a disease of the mind, or of the brain, or the nervous system. Law deals with the fact that there is an activity, a power which we call mind, mental action, resulting in visible action—phenomena; and there are also emotion and, it seems, will-power. Intent is the essence of crime. There can be no intent without mental faculty to perceive; and with this, the will must control evil impulses. These terms are used in their popular and ordinary sense. But nice psychology may be unsafe law. We do not know enough to draw any hard line between mental action and will-power, or even emotion or feeling. Terminology may influence us to regard as a separate office or function, or even a distinct independent faculty, that which is only a form or mode of action. Law is concerned with practical results, and we must neither hang an innocent man nor acquit a criminal on metaphysical disquisition or the medical terminology of insanity, useful in its place. Mental action is either normal or abnormal. The standard of normal action can only be the average, ordinary action of health. No matter what we call it, nor how we define it, nor how we discover it, the practical question with which law must concern itself is, How much departure is there from normal mental action, and what quantum or kind of abnormal action ought to render one legally incompetent or irresponsible?

Evidence.—How shall that degree of insanity that amounts to incompetency or irresponsibility be proved? The mind cannot be seen, handled, weighed, analyzed. Nor can the internal action or movement of the particles or molecules of the brain or any other organ be detected. We judge by results; external phenomena, voice, eye, facial expression, incoherency, delusion—in a word, conduct. Insanity of parents and collateral relatives is competent but not conclusive proof. It only confirms other evidence, and may render less of other evidence necessary, but other evidence of the fact must be given.

Sanity is presumed until insanity is proved. In some probate tribunals an exception prevails, that some evidence must be given of the testator's soundness of mind, sufficient memory and co-ordination to dispose of his effects. This may be proved by non-experts, usually the subscribing witnesses. Insanity being once known, or judicially ascertained, is presumed to continue; and recovery, or the existence of a lucid interval, must be proved. Contracts and wills are held valid if made during a lucid interval.

An inquisition of lunacy raises a presumption of insanity as to acts done after the finding, but this may be rebutted by proof of actual capacity for the act done Whether such an inquisition raises any presumption, as to acts done in the period, usually stated, of incompetency anterior to the finding, is not wholly agreed. The canons of legal reasoning would exclude this effect, as to persons not parties to the proceeding. But the question is of little moment, as any such presumption may always be overcome by proof of actual capacity for the thing done, when done.

The importance of medical treatment of the insane, and of early discovery of incipient insanity, symptoms of it, diseases that may cause it, are not underestimated; yet when we come to prove the *fact* material in law, the degree or kind of abnormal action that will excuse, or render incompetent, it may be that too much, rather than too little, importance has heretofore been awarded to expert testimony, and too little to the testimony, and even the opinions of intelligent, unbiased non-experts, who know and have observed the person; and such may now be said to be the tendency of judicial and legal opinion. The judicial and legal criticism of expert testimony is:

1. The more radical medical views would substitute expert opinion for facts, law, and a trial by court and jury.

2. A specialist is employed by one side to enforce a particular view, and not to discover the whole truth.

3. A specialist may be an unsafe witness by the very habit of mind and study that makes him competent in law as an expert. He may not discover too much, but acute refinements, warmed and pushed by professional enthusiasm, may indicate what does not exist.

4. He may feel as for a patient, as a lawyer feels to a client.

Legal Effects.—The most usual legal effect of insanity is deprivation of personal liberty, by confinement, either for treatment or for necessary restraint; and deprivation of control over the lunatic's estate, which is ordered into the hands of a custodian, generally called a committee. The conditions to be complied with, and the forms to be pursued for either purpose, are prescribed by statutes in the several States, and are so various that no account of them can be given here. The test for appointment of a committee is inability of the lunatic to manage himself, his affairs, business, and property. Of course this inability must be the result of a diseased mind, and not mere carelessness, recklessness, extravagance, or foolish speculation. These often accompany insanity, but sane people being often addicted to them, there must be other proofs of the disease.

Criminal Responsibility.—No history or full discussion of the "Plea of Insanity" in criminal cases can be given here, the subject being too extensive and the authorities too numerous and contradictory. According to the weight of judicial authority, the test of responsibility, the real question to be tried, may be stated in several forms, substantially the same. Was there disease of the mental faculties to such an extent that the accused did not know what he was doing, or did not know that it was wrong? Had he sufficient use of his reason to understand the nature of the act with which he is charged, and that it was wrong for him to commit it? Was his condition of mind such, in consequence of disease, that he was unable to understand the nature of his actions, or to distinguish between right and wrong in his conduct? Other formulations of the test are: Not to know the nature and quality of the act he was doing: Not to know that the act was wrong: Had not the capacity to know the legal or moral quality of the act: Had not mental capacity to distinguish right from wrong in the particular act charged: Had not the power to distinguish right from wrong and the power to adhere to the right and avoid the wrong; though some courts have said it is simply the power to *distinguish*, without reference to the power to *choose*. This seems a radical and severe difference, but may have little influence on the result of the trial. It is the difficulty of defining a mental condition or power we cannot see or know, except in the light of facts *other than the act in question*. Power to distinguish, without power to choose, in the mental sense, could scarcely be called power to *control conduct*. The mere fact of the crime and its enormity and the absence of apparent or sufficient motive raise no presumption of insanity, nor furnish ground to infer it.

If a man, under the insane delusion that he is attacked, kills the assailant, believing that he kills *in self-defence*, he is exempt. But if he is under a delusion that a great wrong has been done him, his mind not being otherwise diseased, and kills the supposed wrong-doer *out of revenge*, he is liable to punishment. If he was sufficiently sane to be responsible when the act was done, it matters not what may have been his condition before or after, though evidence of previous condition is competent, as helping to determine the condition at the time of the act.

The effect of monomania, as an excuse, is confined to the subject about which there is a delusion, or the effects upon conduct caused by the disorder of a single faculty. The monomania must be connected, as a dominating influence and cause, with the criminal act charged. The delusion that a man is followed by an assassin would not excuse forgery, nor the murder of one other than the supposed assassin. The delusion that one is followed by a black dog would not excuse the violation of any one of a thousand police regulations. Yet the legal and still more the medical mind may be tortured by the fear that with one delusion well defined, or one mental faculty distinctly though separately occluded or umbrated, we cannot feel sure whether the subtle influence of the shadow may not have extended over the whole field of mental action. One black spot on the sun does not seem to diminish our supply of light, though accompanied by unexplained and violent electric and magnetic disturbances. It may be said that the justice of law is equal to our knowledge of insanity and its effects upon conduct.

"Moral insanity," associated with mental sanity, or dissociated from mental derangement, finds little favor in medical and mental science, and none in law. It is deemed only another name, more conjectural than scientific, for moral depravity. The term has occasionally been used by courts, but not in the extreme sense given it by some authors.

If "hereditary crime" means anything more than insanity, as an inherited disease, resulting in crime, it is more difficult of proof than so-called moral insanity; and if it only means heredity of disease, the term is equally useless and dangerous. A morbid propensity to commit prohibited acts is no defence, if the accused is not proved to be incapable of knowing the wrongfulness of the acts.

"Sudden, irresistible, insane impulse," though a defence in some States, is generally rejected as a specious, misleading, and dangerous phrase. Three epithets qualify "impulse" instead of a person, or the condition of mind. *Sudden* impulse is no excuse, though heat of blood palliates. "Irresistible" may not logically beg the question in the legal or medical mind, but, helped by "sudden" and "insane," carries in the lay mind a strong implication that the impulse was irresistible, *because the act was done*. "Sudden and uncontrollable impulse," *without insanity*, is wholly inadmissible. "Insane impulse" in the sense of *emotion* means little more than "moral insanity." A sane person may have an impulse so silly or so wicked that in common parlance it might be called an "insane impulse." But the impulse must be that which moves *an insane man*, and then the question gets out of this web of words and back to its original shape: Could he know and refrain?

Contracts.—The legal effect of insanity upon contractual capacity has been likened to that of infancy. But there is a difference. Insanity is more an actual incapacity. Infancy is more a legal protection, measured by age. Insanity, when it avoids a contract, has incapacitated the lunatic by disease, a real incapacity, consent being an essential element of contract. Infancy does not deprive of consent, and ignorance of infancy by the other party is immaterial. The contracts of a lunatic are not necessarily and in all cases void. Where there is any capacity, the question is, Was there enough? and if not, the contract is voidable. Where there is no capacity, as in idiocy or frenzy, the contract is void. The contract of a lunatic incapable of understanding its terms, or forming a rational judgment of its effects upon his interest, is voidable at the option of himself or his committee. A contract beneficial or not injurious to him may be enforced against the other party. Executory contracts may generally be avoided by him. But if a contract, entered into in good faith with a man believed to be of sane mind, but actually of unsound mind, has been performed, and the parties cannot be replaced in their original position in respect of the subject-matter of the contract, both are bound. But with such knowledge or belief, or facts to put on guard or inquiry, the other party is without this protection. One knowing or having reason to believe the lunacy cannot enforce his contract with the lunatic. But while the lunatic cannot bind himself or his estate by contract, his estate may be bound for necessaries furnished in good faith. Necessaries are generally held to be the things he needs, and which are proper for one of his condition in life, the rule here being practically the same as in infancy. Money is usually but not uniformly excluded as a necessary; upon the ground that if a lunatic's estate may be bound by money furnished him it would be a prey for cunning and greed. Legal or medical services may be necessaries. The question, What are necessaries, and were the things furnished necessary? is usually a question of fact to be tried by the jury or other tribunal trying the fact; but a case may be so obvious or flagrant that the court would hold as matter of law, that the article was not necessary, the same as in case of infancy. Monomania, delusion, partial insanity will affect contract in the same way and to the same extent and for the same reason that it does testamentary capacity.

Wills.—Few of the foregoing rules affecting the validity of the contracts of lunatics apply to their wills. A will is the act of one, and takes effect only at death. There can be no question of performance, consideration, or of restitution by or benefit to the lunatic. It is solely a question of capacity. But the measure of testamentary capacity is not always the same. It is flexibly adjusted to the thing done, and the circumstances under which it was done. Any degree of fraud, cunning, advantage, or undue influence weighs more in case of a weak mind, senile dementia, or disease; lack of mind to discern, or force of will to resist. There may have been enough testamentary capacity if left alone; and more pressure or undue influence would be required to invalidate the act of a stronger mind. Less capacity is required to make a will than to make a contract. The testator disposes of things his mind is familiar with, by habit of dwelling on them, while a contract is the act of two, each with his own interest, and requires judgment and discernment about things not so familiar. The distinction is more applicable to extreme weakness of mind, approaching imbecility, than to insanity in its legal meaning. The practical question is, Did the testator know what he was about, and do it freely?

Monomania will affect testamentary capacity very much as it exempts the lunatic from punishment, by directly affecting the thing done; not otherwise. The delusion that a man has a glass arm, or that his horse talks to him through the window at night, would not prevent his making a will not influenced by the delusion.

Torts.—While a lunatic cannot be punished for wrongful acts his estate is liable for damages suffered by others and caused by his conduct, such as assaults upon the person or destruction of property. This rule has been earnestly criticised, but is now firmly established, on grounds of justice and public policy.

(G. H. Y.)

See Vol. XIII. p. 161 Am. ed. (p. 154 Edin. ed.).

INSPIRATION. In the life and thought of the Christian world the phenomenon covered by the word Inspiration has played an important part. The fundamental idea of inspiration is the exertion by the divine mind of a direct influence over the human mind. Of the old prophets it is said, "Men spake from God, being moved"—borne along as a ship is borne on before the wind (Acts xxvii. 16, 17)—"by the Holy Ghost." 2 Pet. i. 21. The mode by which this influence is exerted, the process by which the infinite mind comes into active contact with the finite mind in effecting the required result, is confessedly inexplicable, but the result is a product which bears the authority of God. One human spirit has access to another, and by the presentation of ideas leads that other into new paths of thought and conduct; the Divine Spirit has access to the human spirit, and not only without interfering with, but in co-operation with the rational powers controls the thoughts and directs them toward a given point.

The doctrine of inspiration assumes the existence of a personal, intelligent God, separate and distinct from the material universe. It further assumes that God dwells in and acts through the laws he has established in the universe. According to this doctrine the universe is not a great chronometer in perfect adjustment, left to run on forever, but a network of second causes pervaded by the Creator and under his constant control. In this system of nature man is imbedded, and to have intelligent communication with man the Creator must be a person, and present wherever man awaits his inspiring influence. Inspiration also assumes that this personal, all-pervading God cherishes a fatherly interest in the weal of his intelligent, human creatures, and exhibits this fatherly interest in furnishing men with a knowledge of his own will and of man's duty.

The forms of Biblical expression under which this idea is couched are various. David said, "The Spirit of the Lord spake by me, his word was in my tongue." The most common formula of the prophets was, "Thus saith the Lord." In 2 Tim. iii. 16 the apostle Paul writes of Scripture as "God-breathed." Divine influence for enlightenment and guidance was promised to the apostles. Matt. x. 19, 20; John xiv. 26; xvi. 13. And the apostles claimed that the promise was fulfilled. Paul writes in 1 Cor. ii. 13, "Which things we speak not in the words which man's wisdom teacheth, but which the Holy Ghost teacheth." 1 Cor. xiv. 37.

The great aim assigned to inspiration in the thought of the church is the securement of infallible knowledge of what man is to believe concerning God and what duty God requires of man. In modern times a distinction of importance is made between inspiration proper and revelation. Though often possessed by the same person at the same time they differed in aim and result. It was the aim and end of revelation to convey into the mind of man the matter which he was to utter or to record, and inspiration directed him in the utterance and in making the record. To the prophets revelation was made of events in the far future; the resurrection, the coming judgment, were matters of revelation. Much of the matter on record in the Bible had come under the personal observation of the writer, and respecting that portion of his knowledge there was no need of revelation. Moses may have had trustworthy documents at hand containing the revelations of previous times, and the need in this case was simply for inspiration to secure infallibility in the record. The evangelist Luke assures the reader that he obtained knowledge of those things of which he wrote from "eye-witnesses and ministers of the word." In this case also, as in many others, there was need simply of divine guidance to secure such a record as should express just what God would have expressed. Revelation disclosed truth, inspiration guided to a faultless record of the truth.

Inspiration is also to be discriminated from illumination. The book of revelation is open before the eye; upon its page lie certain truths expressed in appropriate language; but spiritual truths are not visible to the unspiritual man. According to the apostle Paul: "The natural man receiveth not the things of the Spirit of God, for they are foolishness unto him, neither can he know them, because they are spiritually discerned." 1 Cor. ii. 14. Hence the need of the illumination poured into the mind and upon the truth, enabling one to apprehend and appropriate it. Every believer is the subject of this illumination. The claim for inspiration in behalf of the Scripture records is limited to the autograph writings and to faithful copies of the same. Though the original Scripture record was perfect, imperfection may creep into the copies. All such imperfections, however caused, are of course excluded from claim to inspiration.

As to the precise nature and extent of the divine influence called inspiration there has been and is a great diversity of view. These views are classed under various names. Plenary inspiration, as applied to the Scriptures, is an inspiration that is full, to the exclusion of all error, and resulting in an infallible transcript of the divine mind in the case. The same Spirit that near Damascus wrought in the mind of Saul of Tarsus a revolution in the whole current of his thought afterwards so directed his thoughts and utterances that he thought, and spake, and wrote under the influence of a plenary inspiration.

Verbal inspiration is hardly more than another term for plenary inspiration. The term, however, fixes the thought more definitely on the idea that the words employed by the inspired writer, though they are his own, and flow naturally to him in the free play of his rational powers, are, in fact, also the words of the inspiring Spirit.

Mechanical inspiration holds that the Spirit dictates while the writer only puts the words upon the parchment. The man is a mere machine, the *pen* with which God writes, and not the *penman* whom, as a rational being, God employs.

Partial inspiration varies in form and outline. Some hold that certain portions of the sacred record are fully inspired, while some books are the product of the natural powers of the human writers, under the ordinary upholding of an omnipresent God. Others find inspiration in the moral and spiritual elements, in doctrines of the two Testaments, and in those portions that teach the character and purposes of God which were beyond the reach of man; while in the history and biography, and in the general treatment of the facts of science, the writers were not inspired. Some think that inspiration reached only to the thoughts of the writer, and that he was left to himself in committing the thoughts to record.

Inspiration of suggestion is equivalent to revelation. Inspiration of direction and inspiration of superintendence are the equivalent of plenary inspiration. Inspiration of elevation is an effect wrought upon man whereby his natural powers are stimulated to a loftier style than would otherwise be possible.

Practically it matters little what theory of inspiration be held if the result be an infallible rule of faith and life. The great body of those who believe in the religion of the Bible hold that the Bible is inspired in its origin, in its writers, in the providential processes by which those writers were raised up, endowed, and equipped for the offices they were to fill and the duties they were to discharge; in the impulses that led them to write; in the ingress of thoughts into the mind, and in the transfer of those thoughts in words and sentences to the page. (W. P. B.)

See Vol. XIII. p. 167 Am. ed. (p. 161 Edin. ed.).

INSURANCE. The development of insurance in America, like that of many other of our enterprises, has been unique. The necessities of a rapidly growing country of vast extent and incalculable resources required that insurance should be adapted in a broad and comprehensive spirit, if it would play any adequate part in the financial history of the country. Fortunately the men who had the shaping of its early plans and the extension of its subsequent operations appreciated the importance of their mission, and American insurance has in consequence grown, within a single century, from comparatively nothing to a marked prominence among the colossal monetary factors of the present day; so that there are in 1886 not less than 30,000 men in the United States more or less directly engaged in its various branches, acting as officers, managers, clerks, and agents of all grades, from the local solicitor in a hamlet, to the travelling expert and adjuster. The development of American insurance has, however, been symmetrical as well as rapid; but its rate of progress has been one of its most conspicuous characteristics, for there are men yet living who were personally acquainted with its founders. The history of American insurance has been several times ably written, locally as to its birth-place (Philadelphia), by Dr. John A. Fowler, of the *American Exchange and Review*, Philadelphia, and generally by Walter S. Nichols, Esq., of the *Insurance Monitor*, New York, who, in the centennial issue of the *Insurance Blue Book* (1876), presented the most extended and successful embodiment of the scattered annals of American insurance that had been attempted in a single work up to that time. Among our fire and marine companies are now numbered some of the largest, most responsible, and best managed in the world; while our life companies stand absolutely alone in the magnitude of their operations and the sum of their assets, no similar institutions in Europe ever having even approached them in these respects. In most of the other branches of insurance, America is well represented; accident, guaranty, steam boiler, plate-glass, etc., each of which will be treated in detail.

Fire Insurance.—Early in the last century marine risks were written to a limited extent by individuals in Boston, New York, and Philadelphia, but losses by fire were usually followed by a subscription among the neighbors of the unfortunate man, and this practice continued in the newer communities of the West in occasional instances, within the recollection of the writer. In 1752 the first American fire insurance company, "The Philadelphia Contributionship for the Insurance of Houses against Losses by Fire," was organized. The name of Benjamin Franklin appeared at the head of its list of directors.

This company was to issue policies for seven years, and instead of paying a premium, the party insured deposited an agreed sum, the use or interest of which belonged to the company during the pendency of the policy, in which there were none of the exceptions now current in fire policies—public enemies, military and usurped power, rebellion, civil commotion, riot, explosion, etc.—the risk of *all* fires was assumed. Property was covered during the term against any number of losses not total, without reducing the amount insured or impairing the deposit; but if it burned from the first floor upward, the company had the option of paying the whole insurance and ending the policy, or of rebuilding, the policy continuing in force; and this might be repeated any number of times during the term, the policy continuing in force for its whole amount, and the deposit remaining unimpaired. The payment of the deposit, the acceptance of the policy, and the signature of the deed of settlement made the assured a member of the company and a party to all the articles in the deed. Members were liable to the extent of their whole deposits and half as much more in case a conflagration should sweep away all the funds of the company. Interest was allowed members on their deposits, and losses and expenses were charged to them; the balance being settled at the expiration of the contract. This deposit system appears to have been the foundation on which "perpetual" insurance, still practised to a large extent in Philadelphia (and practically limited to that city), was founded.

Eighteen months after the organization of the contributionship, an effort, which does not seem to have had much practical outcome, was made in New York to organize a company. During a considerable portion of the following decade the country was occupied in the war for independence, and in the effort to recover from the losses and ravages incident thereto, so that it was not until the remarkable impulse received by our commerce during the last six or seven years of the past century that insurance had much attention. During those few years, however, no less than 30 charters for companies were granted—7 in Maryland, 6 in Massachusetts, 4 each in New York and Pennsylvania, 3 in Connecticut, 2 each in South Carolina and Rhode Island, and 1 each in New Hampshire and Virginia. Several of these had life privileges, but mainly they were for the transaction of fire and marine business. It is scarcely necessary to say that the payment of cumulative losses, aggregating a sum in excess of the face of the policy, as well as the other crude undertakings of the earlier companies, were soon replaced by more reasonable practices. Our fire insurance contract is now essentially like that in use among other nations, but many forms current elsewhere have never been recognized as desirable here, or else have gained only a very limited foot-hold among our own companies; as the floater, so much used in English mercantile centres; the French plan to meet the liability for loss on neighboring property; the covering of whole lines, and the distribution of the same through reinsurance, etc. Reinsurance is practised here to a considerable extent under pressure from agents whose customers have large properties to cover, but usually the companies prefer to accept only such lines as they can retain. It was only in 1883 that the first American company (the Re-Assurance of New York) was organized to do an exclusively reinsurance business, and as yet it has not had a native competitor.

After the organization of American companies fairly began, they multiplied with considerable rapidity. During the first ten years of the present century 60 charters were granted. Prior to 1801 only three States had been added to the original thirteen, but since then by the increased number of States the area of legislative power has enormously expanded and the number of companies proportionally increased, as appears from the following figures:

Years.	Charters.	Years.	Charters.
1801–10	60	1841–50	401
1811–20	43	1851–60	896
1821–30	149	1861–70	1041
1831–40	467		

Charters increased or decreased in waves corresponding to the financial exigencies of the times. During the first quarter of the century their increase was moderate. In the years 1803 and 1804, respectively, 15 and 16 charters were granted, but for twenty years thereafter only a few appear, until, in 1823, 1824, and 1825, respectively, 15, 20, and 36 charters were granted, and from that time onward with some irregularity they increased more and more, reaching a culmination in the speculative era of 1836, during which year alone 102 companies were chartered. The great New York fire of 1835 undoubtedly contributed to swell that number. After the 1836 speculation subsided, the chartering of companies fell off rapidly, until 1842, in which year only 18 are recorded, the smallest number for thirteen years prior, and smaller than any year since. From 1842 onward to 1860, immediately preceding the war of the rebellion, companies increased rapidly, numbering 109 in 1859 and 94 in 1860, and falling off sharply to 27 in 1862, the second year of the war. In this year imports fell off $130,000,000 from the year preceding, and exports, which in 1861 fell off $112,000,000 and continued to recede in 1862 by $18,000000. Business in many lines was paralyzed, and insurance was in full sympathy with the situation; but under the influence of the inflation, which soon followed, the number of companies increased with unparalleled rapidity, so that in 1865, 1867, and 1869 respectively, 166, 181, and 143 companies were chartered, the largest numbers in any years of American history. In 1865 exports were still on the down grade, but in the next year they rose $220,000,000, and imports also increased $200,000,000. Customs receipts, of course, sympathized in these movements; and if the rise and fall of other commercial and financial waves should be drawn, the curve of the number of insurance charters granted would be found to correspond very closely with them. Since 1870 the increase of joint-stock companies has been very moderate. The great conflagrations of Chicago in 1871 and of Boston in 1872, crushed over 100 companies, but new ones were not organized to fill the places of half of them, and the discouragements which capital had met in this line of business have never since been overcome. Here and there a company assuming prominence has been essayed, but the numerical increase has been almost entirely among the county mutuals, and particularly among what are known as township mutuals, where the farmers and other residents of a few townships organize for mutual protection against fire; of these a multitude has come into existence, organized under general laws. The greater proportion of the companies enumerated above never got beyond the birth of their charters, and although the number of these inchoate institutions has, up to the present time, reached the large aggregate of at least 4000, there are not in existence to-day more than 540 that can be enumerated, omitting the township mutuals and the other county mutuals which have assets of less than $15,000. These, according to the *Spectator Year Book*, are distributed as follows:

	Joint stock.	Mutual.		Joint stock.	Mutual.
Alabama	15		Missouri	4	15
California	11		Nebraska	4	
Connecticut	10	8	New Hamp.	4	9
Dakota	6		New Jersey	12	12
Delaware		3	New York	59	7
Dist. of Colum.	10	1	N. Carolina	2	1
Georgia	4	1	Ohio	29	15
Illinois	8	8	Oregon	3	
Indiana	2		Pennsylvania	41	30
Iowa	14	2	Rhode Island	4	17
Kentucky	12	2	Tennessee	17	
Louisiana	19		Texas	2	
Maine	3	2	Vermont	1	
Maryland	14	10	Virginia	5	1
Massachusetts	19	34	Wash. Ter.	1	
Michigan	3		W. Virginia	11	
Minnesota	1	2	Wisconsin	4	2
Mississippi	2				
			Totals	356	182

This list includes all the joint-stock companies and such of the mutuals as have cash assets amounting to $15,000 or more. While these small mutuals do in the aggregate a considerable business in the rural districts, none of them assume individual importance; and of the joint-stock companies not more than a hundred can be said to have attained prominence, the others are local, or confined to a very narrow agency field. Another class of mutual companies, known as mill mutuals, will be alluded to further on. All the companies from foreign countries, of which there are twenty-four now operating in the United States, it is almost superfluous to remark, are prosecuting an agency business. Indeed, it is the extension of insurance through agencies which has given tone and importance to the business. A somewhat extended review will therefore be given to that system which has brought insurance to its present position of prominence in America.

The agency system in American fire insurance is the outgrowth of necessity. It is within easy recollection that the first railroad on this continent was begun; our distances were magnificent and our means of communication inadequate. At the time when agencies of Eastern companies were first planted, in St. Louis, for example, about 1000 miles from the seaboard, it required, particularly in winter, a month or more for mail transit to and fro. Many points were even more unfavorably situated in regard to one another, and the exigencies of ordinary business required closer connections than the mails could give. Full recording agencies were therefore established at central points, and gradually grew to be the fashion throughout the country. Such an agency is a practical transplanting of the company itself, at least temporarily. The application for insurance is offered and accepted, the survey made, the rate fixed, the premium paid, and the policy issued; and, under the system of monthly reports which formerly prevailed, the company would be carrying a risk five or six weeks before it knew of its existence. To conservative minds such a system appears fraught with danger; it is not necessary, however, to offer any defence of it, as the sequel has fully justified it. The great companies of America are the agency companies; they embody the experience, wealth, and conservatism of the craft as well as its enterprise; and all the European companies that have done a successful business here have accomplished it through a similar system of recording agencies. Under this system the local agent is the fulcrum on which the insurance lever rests; he selects and solicits the business, he is acquainted with the moral as well as the physical quality of the risks, and if he is dishonest or incompetent the affairs of his agency soon reveal the fact in resultant loss, and a change speedily occurs. Next to the local agent comes the special or "field man," as he is familiarly called; he is the "inspector" of England, and sometimes a good deal more. Usually his field of labor is limited to a State, or to such an area as he can become intimately acquainted with. Within this area he knows all the agents and all the risks; by continual visitation he keeps himself familiar with the whole status; he appoints agents and suspends them, under instructions from head-quarters, of course, and is in his district the champion, defender, and particular representative of his company. He inspects properties, approves or cancels policies, raises rates, reduces lines, suggests improvements, and is a sort of ubiquitous balance-wheel to the whole business. While the local agent is paid a commission on the amount of premiums secured, and so is open to numerous temptations to extend his business beyond the line of prudence, the special is a salaried man whose reputation depends upon the success of his immediate field, and whose destiny is more directly in the hands of the company which employs him. It is to his interest, therefore, to control the agents in his district, and bring about results therein which shall be profitable to the company. Next to the special agent stands the general agent or manager. Most of the companies which do a general business separate the United States into at least three principal divisions—the Eastern, which is usually the home of the parent office; the Western, and the Pacific coast branches. Some of the companies make numerous other divisions, creating sometimes ten or more departments; but usually the number is limited to three or four—Eastern, Western, Southern, and Pacific coast. Over each is appointed a manager or general agent, who is frequently a graduate from the field force, and a man selected for his peculiar ability and familiar acquaintance with the territory over which he is to preside. To him the local agents report, and by him the special agents are employed. Formerly the local agent reported his transactions only once a month, but within the last twenty years there has grown up a system of daily reports which has become universal. The local agent reports each risk on the day it is written, on a separate blank which contains a verbatim copy of the written portion of the policy, a survey and diagram of the risk and its exposures, and a complete description and history of the case drawn out by numerous questions, which he is required to answer.

Daily reports reach the general agent or manager by every mail, and if his district is a large and well-cultivated one he frequently has 100 or more of them per day. The examination of these "dailies," the correspondence growing out of them, the frequent cancellations and changes, the instructions to specials, the reports to the home office, etc., involve the employment of large corps of clerks, and the occupancy of extensive offices. Formerly Cincinnati was pre-eminent in this regard, and it still retains a number of the more important Western branches; but Chicago has become the great insurance centre of the West, and now contains no less than 45 of these general agencies, some of them of a very extensive character, occupying some of the finest and largest office accommodations in the world, and manned by expert talent in the persons of accomplished men who would do honor to any branch of business. Incident to these extended and somewhat complicated transactions is the business of adjusting losses. In simple cases this is sometimes attended to by the local agent, under instructions from the manager or home office, and sometimes by the special; but in nearly all important cases professional adjusters are employed. The larger companies have several of these attached to their individual corps, but there have grown up numerous independent adjusters and several adjustment bureaus to meet the extended requirements of the business. These men are *sui generis;* there are not a great many losses which are so utterly total as to adjust themselves, and if there is any hope whatever for salvage, a professional adjuster is quick to see it and ingenious to avail of it. These men are among the shrewdest and best informed in the business; they must be acquainted with insurance law, so as to know their legal rights, and they must be *au fait* to every branch of trade, commerce, and manufactures, so as to be as ready to meet an intricate question of patents on the latest improvements in machinery in a modern mill, as a question of prices and profits on the stock of a remote country store. These gentlemen are no favorites with the claimant, and to the incendiary and fraud they are an especial abomination. Out of the popular prejudice arising from their close work has arisen much of the legislation adverse to insurance companies which has been so fashionable in the State legislatures —valued-policy laws, non-removal of suits, arbitrary forms of policies, etc.; but in spite of all this, the adjuster is a man of broad intelligence, large ability, and good conscience. The incentives to fraud presented to dishonest men by the easy obtaining of large lines of insurance, and the facility with which the crime of arson may be secretly committed, has resulted in a great number of incendiary fires and fraudulent claims. These, in turn, have compelled the companies to resort to measures for frustrating the designs of bad men upon their funds. Prominent among these are the system of rewards for the detection of incendiaries adopted by the national board, and the establishment by the companies of bureaus for the interchange of information concerning bad loss cases, which give to each the experience of all in that regard, enabling them to avoid parties who have been unprofitable customers to other companies. The sums actually paid out for loss-claims by fire-insurance companies in the United States now aggregate more than $60,000,000 annually, and it is worthy of note that less than 1½ per cent. of this large amount becomes the subject of litigation. Enough litigation has occurred, however, to result in a well-defined system of insurance laws (not statutes), of which the 15 annual volumes of the *Insurance Law Journal* contain the most complete record to date. Treatises on insurance law have also from time to time been issued by some of our most eminent legal writers.

We have in the *Chronicle* fire tables the most complete record of the fires of the country now in existence. These appear year by year in extended tables of details, by classes of risks, by States, by causes, by monthly averages, by numbers, etc. We are permitted to copy a condensed table of the aggregate losses for 1875–84, as follows:

Years.	United States.		Canada.	
	Property loss.	Insurance loss.	Property loss.	Insurance loss.
1875.....	$78,102,285	$39,325,408	$8,225,750	$4,306,300
1876.....	64,630,600	34,374,500	9,145 200	3,887,600
1877.....	68,265,800	37,398,900	29,261,000	10,637,700
1878.....	64,315,900	36,575,900	5,950,500	3,102,700
1879.....	77,703,700	44,464,700	7,157,000	3,856,000
1880.....	74,643,400	42,525,000	5,194,600	2,359,800
1881.....	81,280,900	44,641,900	8,237,400	3,701,600
1882.....	84,505,024	48,875,131	5,605,940	3,047,341
1883.....	100,149,228	54,808,664	6,266,131	3,382,987
1884.....	110,008,611	60,679,818	6,900,815	3,320,834
Totals.	$803,605,448	$443,669,913	$91,946,336	$41,602,862
Grand total for U. S. and Canada...			$895,551,784	$485,272,775

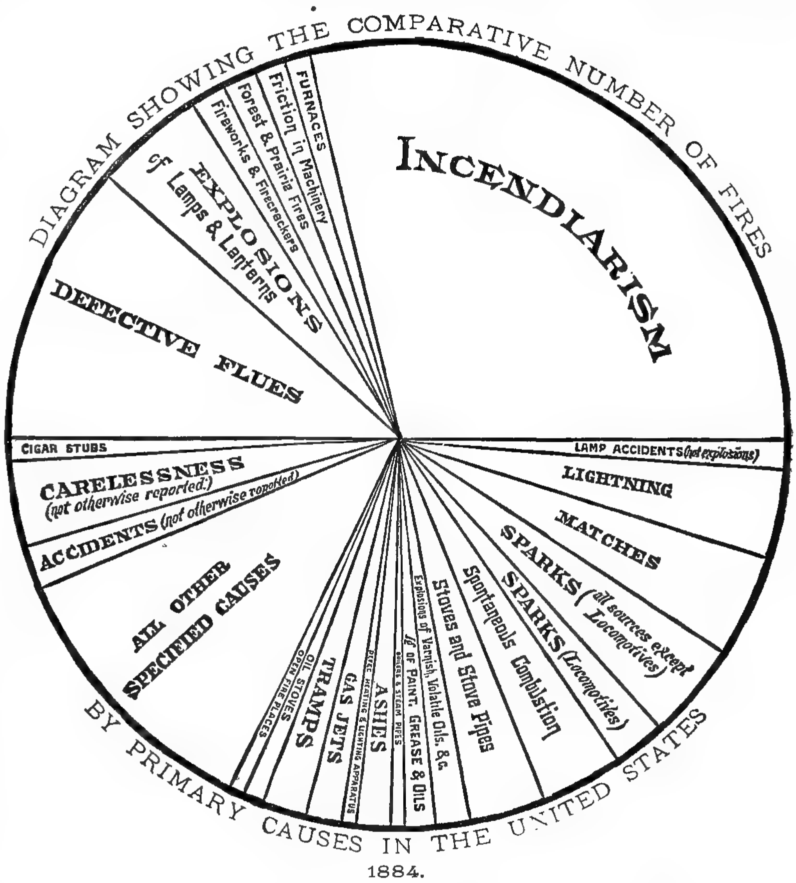
Incendiarism is perhaps as rampant in this country as in the old world, but considerable divergence of opinion exists, both here and there, in regard to the proportion of fires attributable to it. Among those who have given most study to the subject, however, there is a settled conviction that about one-third of the insurance losses are chargeable to incendiarism. We are again indebted to the *Chronicle* fire-tables for a diagram which presents to the eye in a more graphic manner than any table would do, the magnitude, both actual and comparative, of this gigantic enemy of insurance and the general public. (See next page.)

The numerous obstacles to success made the necessity for combined effort and harmonious action among the companies obvious almost from the very outset. Whether the business is an art or a science, whether it can be most successfully conducted on principles ascertainable through observation of the combined experience of the companies, or by the personal shrewdness and tact of individual managers, was, and still is, a mooted question; but by common consent, from the beginning of the business to the present day, some sort of concerted action has been constantly sought for. This was emphasized by the early occurrence of great conflagrations. The "great fire" of 1835 in New York, followed by one in Philadelphia in 1839, by another in Brooklyn, and by others at different points, up to the second great fire in New York in 1845, convinced American fire underwriters that they needed each other's counsel and advice; and shortly after the disaster of 1845, an association was formed in New York, under whose auspices the first national congress of fire underwriters convened in that city in May, 1846, to secure, if possible, general co-operation among the companies, and to remedy, if possible, the existing demoralization of rates. The question of rates has indeed been the pivot on which nearly all the action of such bodies has turned; its overshadowing importance has been indicated by the tone of debate and the course of action taken at nearly all similar meetings. The caustic motto, "Fire insurance is a magnificent system of guessing," has been current for fifty years and more, and the reasons which suggest it are not yet obliterated. As nearly as could be ascertained at these early meetings, the profits for 20 years preceding 1846 had not equalled 3 per cent. of the premiums, and losses were everywhere increasing, no classes of property being exempt. Again, in 1849, eight prominent companies of New York and New England came together and prepared the first scheme for securing a uniform tariff of rates throughout the country, to be made operative by their agents co-operating with other agents and local companies in the various cities and towns. Agents might increase these rates whenever they found it necessary, but in no case were they to go below them. In 1850 a third convention was held, and the tariff as then modified remained the standard of the country for the succeeding 15 years. Meantime the war of the rebellion came on in 1861, and the general depression and uncertainty which followed its outbreak had its influence upon insurance as upon other branches of business. Values fell, and insurance lines fell with them; but the stimulating effect of the war upon industrial interests soon induced a rebound which was more notable than the depression had been. This will readily be seen by a comparison of the figures in the following table:

Years.	Cash capital.	Total assets.	Premiums.	Losses.	Risks in force Dec. 31.
1859...	$34,072,219	$52,484,463	$15,723,113	$8,517,742	$1,498,569,125
1860...	30,298,750	44,372,386	13,407,701	8,450,469	1,345,004,487
1861...	29,384,260	43,039,394	12,400,644	7,665,985	1,258,972,728
1862...	29,834,260	45,748,807	13,404,596	8,341,380	1,372,766,641
1863...	33,246,760	53,580,550	16,414,223	7,321,444	1,612,361,852
1864...	41,629,945	67,017,663	23,843,521	13,705,890	2,223,833,544
1865...	46,398,146	70,366,778	25,419,588	17,264,617	2,564,112,505
1866...	45,796,428	70,736,376	32,281,404	23,913,745	2,945,381,297

Note.—Accurate statistics covering the whole United States during this period are inaccessible. Only a few of the States had insurance departments in the earlier years, and only such companies as did business in those States left any statistical record. The above figures are from the New York insurance department reports, and while their magnitude would be somewhat enhanced if the whole field could be made tributary to them, their significance would not be materially changed. They include all the great agency companies of this country, all the foreign companies, and all the joint-stock companies of New York State.

At the close of the first year of the war capital was withdrawn amounting to $4,687,959, assets were diminished $9,445,069, premiums fell off $3,322,469; while losses only decreased $851,757, although the risks in force diminished $239,596,397. During the years from 1861 to 1866, the expansion of the currency, the fictitious increase of values, and the mad spirit of speculation all had their influence on fire insurance; the business increased enormously, but while the premiums were more than doubled, the losses more than tripled. With the exception of 1863 the loss ratio was abnormally high, and in 1866 it reached the highest point of *loss to risk* ever recorded in America, 81 per cent. The department figures for the years of the great Chicago and Boston fires do not equal this.*



The good effects of former efforts to secure combined action had long been dissipated; dissensions had weakened the New York association; and the animosities growing out of divergent opinions and interests in connection with rates, commissions, brokerage, etc., had resulted in about half the New York companies going out. In February, 1858, of the 81 New York companies 38 were anti-associationists. Then compromise measures were inaugurated, which resulted in the formation of the present New York Board of Fire Insurance Companies. This organization went into operation April 20, 1858, meeting, however, clashing interests at the very outset, which threatened to destroy it; but new compromises resulted in harmony, and the board has since become a powerful factor in connection with the insurance interests of the metropolis and of the whole country. The disastrous condition of affairs above alluded to induced the New York board to issue a call for a general convention of the companies, and 57 New York city companies and 35 from other cities and States, met on July 18, 1866, and formed the National Board. Pending the call a great fire occurred

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* This is accounted for by the great number of companies that were crushed and never reported after those disasters. Had their figures been turned in, the ratio would unquestionably have been quite beyond anything in our insurance history, but as they were not, the record of the year 1866 maintains its bad pre-eminence.

(July 4, 1866) in Portland, Maine, involving a loss of some $6,000,000, more than one-half of which fell upon the insurance companies and emphasized the invitation to the proposed union. The meeting of July 18 was harmonious and full of promise; four objects were defined: (1) The establishment of uniform rates; (2) uniform commissions; (3) repression of incendiarism; (4) protection of common interests. An executive committee of fifteen was chosen from the principal insurance centres, and to this committee was confided the principal work of the board. For two years this organization continued to prosper, but in 1868 the necessity which called it into existence had partially disappeared and disintegration began; special tariffs of rates were found to be impossible of general application, and many companies yielded to the dissatisfaction of agents and broke away from board regulations; so that the combination which promised to become a great benefit in American fire insurance soon appeared to have become a great failure. Experience seems to have demonstrated that cohesion among insurance companies is dependent upon adversity. When the great conflagrations of Chicago and Boston occurred the National Board revived and for several years exercised a potent influence which brought harmony out of chaos, profit out of disaster, victory out of defeat. In its reorganization a general agent, sustained by the executive committee, wielded almost imperial powers. For a time it seemed as if almost anything could be done by the National Board, and as if nothing could be done without it. At its dictation the fire department of Chicago was remodelled; rates all over the country were arbitrarily advanced, in many instances doubled; agents were disciplined and fined large amounts; and the private judgment of companies appeared to be to a large extent suspended in its favor. Exercise of unlimited power soon resulted in its abuse, and another decline set in, from which it has never recovered. A separate chapter of great interest to American fire underwriters might be written concerning the National Board. Loath to abandon it, and yet conscious of its inability to do what was needed, the companies attempted a collateral association called the United Fire Underwriters in America. At the initial meeting of this organization in 1880 no less than 170 companies were, directly or indirectly, represented, a much larger number than had ever before united in any similar movement. At the very outset, however, it became evident that discordant elements had come together. Some companies demanded that the overshadowing subject of rates and agents' commissions should be acted upon, while others, wishing to retain those matters in the National Board, insisted that the new organization should be restricted to the discussion of general themes and to the improvement of social intercourse among officers and managers. Within three years it faded from sight. The National Board still retains its organization, awaiting the time when it can come forward and be of service to fire insurance, but at present it does not pretend to exercise any influence upon the business. In the annual reports of its presidents and committees are to be found some of the most elaborate and valuable statistics, records, synopses, etc., that have ever been compiled in connection with fire insurance.

Besides the National Board there have been some powerful bodies, more or less local. Among these the Union in the North-west, the New England Insurance Exchange, and the South-eastern Tariff Association are the most prominent. These establish local boards (of which there are now an immense number all over the United States), organize compacts, and exercise control over the general direction of the business. They are composed of officers and managers of companies mainly, but in many instances the field men are prominent in their operations. The local board, which is the focus on which all these superior organizations converge, is a voluntary or compulsory organization among the agents of a town or city for the purpose of making rates for that locality and promoting uniformity of practice. State boards exist in many of the States and do in their several localities what the union does on a larger scale. In the North-west there is a number of State boards auxiliary to the union, all engaged in the promotion of local organizations at those points where agencies of the companies are situated.

One of the most remarkable outgrowths of the widespread agency business in this country is a comparatively recent organization known as the "compact." General rules having failed so many times in their particular application; local boards having likewise failed in numerous instances to harmonize local competitions; demoralization in rates and practice having prevailed in many localities until the interests of companies and agents alike were jeopardized, it occurred to the agents of Kansas City in the year 1882 to come together under a cast-iron agreement, each conceding whatever might be necessary for the general good. The movement was a success, and similar organizations rapidly sprang up in other large towns and cities, so that in a few years compacts more or less like their Missouri prototype existed in great numbers; and under their arbitrary but beneficent rule risks were improved, rates equalized, practices purified, and the business was relieved from many of the losses and annoyances incident to divergent and heterogeneous practices.

The compact, being to-day one of the most powerful and important factors in the conduct of the business in a large section of this country, is here briefly described. *The compact is local.* The agents of a city ask all the companies doing business there to agree to support the system and require their agents to co-operate in the formation and maintenance of a compact. If a large proportion of the companies assent, a compact manager is appointed by the body having jurisdiction (the union in the North-west and other similar bodies in other districts), and the compact agreement is presented to the agents for signature. By the pressure of local emergencies, the good sense of the agents themselves, and the gentle compulsion of the companies, all, or nearly all, the agents sign a pledge or "compact" wherein they agree, under the pain of heavy penalties, (*a*) not to write any risks until rates have been fixed by the manager, and to adhere to such rates when fixed; (*b*) not to divide commissions with or make rebates to customers; (*c*) to hold in strict confidence all proceedings of the compact meetings and all words of local or special agents in regard thereto, and to promote good-fellowship; (*d*) to restrict long-term business to agreed bases; (*e*) to submit books and to submit themselves to personal examination under oath to the manager whenever he may regard it necessary, refusal to be deemed *prima facie* evidence of guilt; (*f*) to abide by agreed regulations and details in regard to modes of business, short-term risks, renewals, specifications, etc.; (*g*) to be responsible for the acts of employés and to limit the number of solicitors as agreed; (*h*) to avoid non-concurrent policies, etc. Penalties for violation include the cancellation of the policy and a prohibition from writing the same risk for one year, and a fine of not less than $25 for the first offence, not less than $50 for the second, and removal of companies and expulsion for the third. Harsh and even humiliating as these terms may appear, they have nevertheless worked well in actual practice. All the agents having agreed to them, no one is discredited, and as the usual object of men in uniting in a covenant of this sort is not so much to bind themselves as to get the others bound, and as the fatal seed of discord in any craft is not so much actual malpractice as the spectre of suspected malpractice in others, this compact system appears to meet, and does meet, the requirements of local agencies and to remedy many of their besetting evils. When the manager is wise and able, it is now a rare thing for an agent to desire to withdraw from a compact. The manager is selected for his general experience, knowledge of the business, and fitness for such a position, and must have been a non-resident free from local bias. His salary and office expenses are paid from fines and by an assessment on the local premiums of the companies, each paying *pro ratâ* to income at that place. The duties of the manager are diverse. Outside his office he inspects and rates all the risks in his jurisdiction, keeps track of new buildings, suggests improvements to property-owners whereby they may secure lower rates, and maintains a general oversight of fire insurance and cognate matters, whose tendency is towards the good of the community as well as the companies. Inside his office he examines the daily reports which all the agents submit to him instead of mailing direct to their companies; sees that forms of policies are correct, locations accurately described, rates according to tariff, and generally that each risk is properly written. If not correct it is returned to the agent; if correct it is stamped with his official stamp and mailed to the company. There are a great many details growing out of this daily routine which it is unnecessary to describe here, but it is easy to perceive from what has been said that the compact promotes harmony of practice, equality of rate, and the general dignity and good of the insurance business and of the community in which it exists.

Numerous other organizations exist among the companies and their representatives which can here only be named. The Alliance is a private combination of 27 companies doing business in New York for mutual advantage; daily bulletins are issued containing confidential information, warnings, etc., contributed by each for the benefit of all. Two organizations of fieldmen have existed for a series of years, the Fire Underwriters' Association of the North-west and the Underwriters' Association of the South, which take high rank for the literary character of their proceedings; some of the most thorough and instructive papers ever written on fire insurance topics have been read at their annual meetings; eminent scientists have lectured before them on spontaneous combustion, dust explosions, electricity, and other subjects relevant to insurance; the most illustrious American insurance officers have addressed them, and speakers from Europe have been honored by invitations to participate in their conventions.

In this connection may be mentioned insurance journalism, which is more prominent in America than elsewhere in the world; partly because of the newness of the business here, which affords much opportunity for comment, advice, instruction, etc., but mainly because of the able conduct of the journals themselves and the fearless and intelligent stand which they have taken in their criticisms of plans and organizations. To a considerable extent journalism has taken the place of book literature in the body of the craft; nevertheless a goodly number of American books have been published, particularly on the law of insurance. The large area over which the business is spread and the resulting importance of the local agent have brought out a number of books for his special use, and some of the companies have also published monthly periodicals as a means of communication between themselves and their agents. This is less practised, however, among the fire companies than among the life.

The insurance departments of the several States, while largely the playthings of the politicians, have nevertheless exerted a marked influence on insurance in this country. This may be expressed in a single word, "publicity." The companies are annually subjected to the most merciless catechising, some of which is intelligent; and they are liable to individual examination at any time, when, in the judgment of a commissioner in any State where they do business, it may be necessary. In these examinations nothing is considered private, not only the books, accounts, etc., but the letter-files and the minute-books of the directors and committees are overhauled; concealment and false exhibit can be had only at the price of perjury; and companies thus compelled to live in the open day are relieved from temptation to dereliction and are generally not only sound and solvent but publicly known to be so. The Massachusetts department was the pioneer. As early as 1827 the law of that State had required agents of other State and foreign joint-stock companies to file powers of attorney and copies of company charters, and to make brief statements of condition; in 1837 Massachusetts companies were required to make returns to the secretary of state; in 1842 similar arrangements were imposed upon the marine companies; and in 1847 mutual companies of other States were included. These were the germs from which the celebrated Massachusetts insurance department finally grew, which issued its first annual report in 1856, but which came into greater prominence three years later when there arose a special necessity for the supervision of life insurance; and its first important act was the exposure in 1859 of the bankruptcy of the International of England and its expulsion from that State. In 1855 the comptroller of the State of New York had recommended the establishment of a separate insurance department. This recommendation took shape in the law of 1859 and the organization of the New York department, which issued its first report on the 1st of March, 1860. In this case the urgency arose from the existence of a number of irresponsible joint-stock fire insurance companies and the prevalence of wildcat practices among the mutuals, with which the State of New York, in common with many others, was at that time flooded. The organization of the New York insurance department was urgently advocated by the most prominent fire insurance officers of the day; and while widely conflicting opinions have since been expressed concerning the good of State supervision, the departments have generally retained the approval of the managers of the old and wealthy companies. The example set by Massachusetts and New York was followed by other States, and now nearly all States which do not have insurance departments impose upon the auditor or some other officer of state the duty of supervising the companies which do business within their borders. In at least 15 States these departments have risen into more or less of prominence, and for some years past the commissioners have held annual conventions for consultation and mutual understanding in regard to departmental work.

Legislation on insurance matters has always been a favorite recreation with the general assemblies of the several States, and, while beneficent in the main, has resulted in the passage of some grotesque laws, such as making it obligatory upon a company to pay the full amount of a policy on a building totally destroyed, without regard to the actual value of the same; dictating the form of contract to be used; restraining companies from appealing to the U. S. courts; and in other ways arbitrarily abridging the liberty of the companies and their clients in arrangements which they may mutually desire to make in regard to insurance.

During the last thirty years there have been coming into notice in New England companies known as Factory Mutuals, whose plans have all centred upon "the prevention of loss by fire" rather than the estimating of hazards as they exist and the gradation of premiums to meet losses on such hazards. There are now nineteen of these companies which work in harmony, and this style of "mutual idea" has taken shape in the formation of numerous companies elsewhere. The nineteen companies alluded to have since organization written $4,260,382,765, on which the loss has been $10,513,209.84, or 0.2467 per cent.; taxes and expenses bringing the cost of insurance, up to Dec. 31, 1885, to 0.2979 per cent., or say $2.98 on each $1000 of risks written; that is a fraction below three-tenths of one per cent. During the year 1885 these companies wrote $405,570,168 of risks, on which they incurred losses amounting to $521,163, or $1.33 per thousand; which, with expenses and taxes, made the cost of insurance that year $1.51 per thousand, a fraction over $\frac{3}{20}$ per cent. But these companies are organized for fire prevention rather than for fire insurance; each building covered by them must be up to a certain standard in regard to construction and equipment; the introduction of automatic sprinklers, steam-pumps, systems of pipes, and so on being prerequisites to membership; and they appear to be adapted for successful operation only among those detached risks which they can control; the exposures among the crowded risks of a city presenting questions not yet proved to be solvable by this class of companies.

To compress within the limits of a single article all that might be regarded as of interest in connection with fire insurance is impracticable; chapters would be required adequately to treat the legal aspects of insurance; the taxation and deposit laws; the retaliatory laws; the efforts, statutory and otherwise, for the suppression of "underground" insurance, and the laws relating to buildings. The same remark applies to conflagrations and their causes, and the new fire hazards which have followed the development of petroleum products, electric lighting, etc. The same is true in regard to the whole subject of the prevention and extinguishment of fires (see FIRE DEPARTMENT), water supplies, salvage corps, etc., each of which requires full description. Then there are many matters more strictly professional, but of great interest to the craft; as, the classification of risks, schedule rating, fire maps (the Barlow surveys alone comprise 86 large volumes, wherein 8600 manufacturing risks are described with the utmost minuteness, and are illustrated by diagrams and the most elaborate isometrical drawings); all these, as well as the vexed questions of brokerage, commissions, rebates, are passed by with this mere mention. The importance of this great interest will be somewhat appreciated by a study of the following tabulation of risks covered, premiums received, and losses paid for the past 27 years, which is compiled from the New York insurance reports from the first issue of that department. The insurance reports of the several States are in many important particulars duplicates of one another, the bulk of the matter in each being made up from the statements of the agency companies which do business in all. That of New York is the most complete of any, and the figures presented, while covering perhaps only two-thirds to three-fourths of the business of the whole country, give a very fair exhibit of the motive of the whole:

December 31.	Risks in force.	Premiums.	Losses.
1859	$1,498,569,125	$15,723,113	$8,517,742
1860	1,345,004,487	13,750,761	8,450,969
1861	1,258,972,728	12,400,644	7,665,985
1862	1,373,766,641	13,404,596	8,341,380
1863	1,612,361,852	16,414,223	7,321,444
1864	2,223,833,544	23,843,521	13,705,890
1865	2,564,112,505	25,419,588	17,264,617
1866	2,945,381,297	32,281,404	23,913,745
1867	3,165,666,666	36,647,695	21,169,632
1868	3,420,490,029	37,395,740	19,283,978
1869	3,778,713,296	39,353,578	20,054,341
1870	4,035,907,596	37,237,621	21,869,440
1871	3,987,386,026	36,821,051	31,617,273
1872	4,529,668,179	43,519,321	33,728,763
1873	5,783,777,818	62,818,069	37,731,633
1874	5,889,403,314	61,645,202	26,199,312
1875	6,039,507,339	59,285,105	27,695,628
1876	5,914,565,904	54,302,706	27,148,687
1877	6,008,976,461	50,891,012	27,467,852
1878	6,229,312,193	45,139,125	23,261,969
1879	6,673,099,069	48,327,641	28,787,630
1880	7,184,511,455	53,899,092	29,772,356
1881	7,949,581,516	61,050,596	34,712,071
1882	8,534,253,737	67,673,348	40,682,025
1883	9,359,423,527	75,593,477	44,893,676
1884	9,736,329,252	78,365,753	48,946,330
1885	10,517,940,175	81,251,444	47,753,787
Total	$133,560,515,731	$1,185,455,426	$687,958,155

These figures show that the percentage of insured property burned during 27 years has been 0.5151, or $5.15 per $1000 covered; while the proportion of premiums lost has been 58.03 per cent. Allowing 30 per cent. of premiums for the expenses of the business, it would appear that the companies had realized a profit of nearly 12 per cent.; but such a conclusion would be false, because the figures are the product not only of the living companies which made their reports last year, but of the hundreds of others which have fallen by the way since the record began. The great fires of Chicago and Boston swallowed up 100 companies, and from the beginning of the century to the present day not less than 1000 have perished, involving the loss of many millions of capital; so that, if the history of fire insurance in America could be written out in all its details, it would probably show that while there have been some examples of shining success, the average result of the whole business has been one of loss rather than of profit.

New York is much mentioned in this article because the completeness and accessibility of its department reports furnish material to which an annalist constantly and naturally refers, and because, as a commercial emporium, it has been the rallying point of most of the movements in connection with insurance; but Hartford, in proportion to wealth and population, is a more notable insurance centre, and is the home of the largest American company and of several of the most conspicuous instances of large success in the agency business. Philadelphia also claims prominence, not only because it was the birthplace of insurance on this continent, but because of the great wealth and high repute of its existing companies. Cincinnati. San Francisco, New Orleans, St. Louis, Chicago, and some other points are also the homes of large and reputable companies. (C. C. H.)

LIFE INSURANCE.—The history of life insurance in the United States would be exceedingly imperfect without a reference to England, where the system was first practically developed, where until the last thirty years it was chiefly prosecuted, and where the mathematical principles on which it rests have always received the most thorough study. Like the people, the social customs and the laws, the germs of life insurance were implanted in the colonies from the mother country. The undertaking, by what was known as the Mercers' Company, in London, in 1698, to furnish annuities for the benefit of the widows of the clergy of the Episcopal Church, followed eight years later there by the Amicable Society for general life insurance, has usually been regarded as the real starting-point of the business abroad. But from the days of Saxon England these companies have been antedated and the way paved for success by trade guilds and friendly societies. The history of life insurance in the United States follows the same channels. Benevolent societies in America were among the first outgrowths of its settlement. The first Freemasons' lodge was established in Boston in 1733. From that date to the present charitable organizations have never ceased to play a prominent part among the social institutions of America. In imitation of the Mercers' Company, the Presbyterian Annuity and Life Insurance Company, of Philadelphia, the first life insurance society in the New World, received its charter in 1759 from Thomas Penn, the proprietor of the province of Pennsylvania, and commenced business the same year. As the name imports, the object was confined to the families of the ministers of the Presbyterian Church. Outside a narrow circle its work was unknown until in 1875 it procured a chartered amendment, reported to the Pennsylvania department, and undertook a wider field of action.

In 1769, the proprietaries of the same province chartered another similar and better-known society, the "Corporation for the Relief of the Widows and Children of Clergymen of the Church of England in America." Like charters were procured by the corporators in the neighboring provinces of New York and New Jersey, constituting one corporation in the three jurisdictions. The business at first consisted simply in granting reversionary annuities to the families of deceased clergymen. The scheme was crude and simple, and the rates of contribution, at the instance of Benjamin Franklin, were computed by Dr. Price, of England, author of the celebrated Northampton Mortality Tables. After the Revolution the corporation was separated into three independent organizations in the three States. The Pennsylvania and New Jersey societies still exist, with modifications in their original system.

These two companies were the forerunners of life insurance in the United States, but their operations were confined to a single class, and were limited to granting annuities, which was the only form of life insurance then familiar. A third corporation, which was chartered in Maryland, in 1784, for the benefit of the Episcopal clergy of that State, closes the history of the corporate enterprises prior to 1800. For many years thereafter the financial condition of the country remained unfavorable to the development of general life insurance; the business had not even acquired an extensive foothold abroad. But another scheme nearly analogous was introduced about 1790, and probably grew out of the intimate relations subsisting with France. Tontines, the earliest form of life insurance projects, were at that time exceedingly popular on the continent of Europe. Public lotteries, on the other hand, had for years been countenanced, by the colonial and State legislatures, as a convenient method of raising public funds. The idea of applying the Tontine system to accomplish the work of lotteries appears to have suggested itself. A universal Tontine, for the purpose of raising money upon lives, to be applied to charitable purposes, was projected in Philadelphia in 1792; but the original design failing, the subscribers, in view of the need of marine insurance, devoted the funds to the organization of the first marine company in the country, the Insurance Company of North America. Similar Tontine enterprises were about the same time started in other cities; one of which, in New York, terminated only a few years since.

Notwithstanding the crude condition of higher education in the infant colonies, statistical studies pertinent to life insurance early attracted attention. The birth rate and death rate were subjects of inquiry by Dr. Price before 1750, and in 1782 Prof. Wigglesworth, of Harvard University, contributed the first scientific investigations ever made into the mortality of the colonies, which was followed in 1789 by the compilation by him of a standard mortality table, based on the mortuary returns of 62 scattered hamlets in Massachusetts and New Hampshire. This table continued for many years to be the recognized legal standard for the valuation of life estates in Massachusetts. Closely following the table of Wigglesworth, the first national census was taken by the new government in 1791, the representative character of the government requiring an enumeration of the inhabitants at stated periods, a practice in which the United States first set the example, and out of which has grown those census mortality tables which, both in the United States and elsewhere, have proved so serviceable to life insurance.

Though a few fire and marine companies had incorporated life privileges in their charters, there is no reason to believe that such privileges were exercised by any company doing a general business until 1812, when the first general life company was chartered, the Pennsylvania Company for Insurances upon Lives and Granting Annuities. This company, too, was in Philadelphia, which was at that time the most important commercial city in America, and has been properly styled the birthplace of American insurance. Annuities were still the only form of insurance that was generally known, a fact due to their common employment among European governments for raising public funds. The company was started with a cash capital of $500,000, and though some children's endowments and life policies were issued, annuities for a number of years constituted its principal business, and in 1836 it assumed also the work of a trust company. Its earlier contracts were made upon the basis of the Northampton tables commonly used in England, but attempts were speedily made to procure reliable American statistics. The Pennsylvania company was followed in 1818 by the organization of the Massachusetts Hospital Life Insurance Company, also with a stock capital; being an outgrowth of the Massachusetts General Hospital, which had been chartered in 1811 in that State, with a monopoly life insurance privilege added. The latter was surrendered to the new company upon payment of a percentage of its insurance profits to the hospital. The apparent result of this insurance monopoly was to place a check upon the prosecution of life insurance in Massachusetts, until the law was finally evaded by the organization of mutual companies and the passage of an enabling act in 1843; for the Hospital company, finding a trust business more profitable, devoted its chief attention to this branch, to which it is now exclusively confined. Nathaniel Bowditch was the first actuary of this company. The case of Lord *vs.* Dall, in the Supreme Court of Massachusetts, in 1815, was the first life insurance suit in America, and showed how little was known on the subject. The suit was against an individual underwriter, who, in 1809, had insured the life of a party on a voyage to South America as if it were a marine risk. The case was without precedent, but the court concluded on general principles that the contract was not repugnant to public policy and could be enforced.

Between 1820 and 1830 a number of fire and marine offices in New York essayed to add a life business, but their efforts proved abortive and ended with the issue of a few policies. Not only was the business unfamiliar, but for many years later a strong popular prejudice existed against such insurances as immoral and irreligious. In 1830 another important company was added to the list—the New York Life Insurance and Trust Company—with a capital of $1,000,000. For ten or fifteen years the life department was actively prosecuted, and it was regarded as one of the leading offices engaged in this branch. A fair measure of the public appreciation of life insurance at that time is furnished in the first nine years' experience of the company. About 1800 policies in all had been issued, of which 690 were in force in 1840, insuring $2,451,958; while 24 annuities were in force, involving annual payments of $7563. But here, too, the trust department was found more profitable, and the life branch has gradually been dropped. One other company also was incorporated in 1830, the Baltimore Life, with a capital of $50,000; a trust business was added eight years later. After a conservative business of thirty years, the company reinsured its risks and retired.

These were the pioneer life offices of America; all were conducted on the principles then prevailing in England. The business was proprietary; dividends were only made at the end of a term of from five to ten years, and one insisted on reserving the entire premium receipts until the policy became due. The reason for this extreme caution lay in the ignorance regarding the value of life in America, which was popularly believed to be much less than in England. The tables in use were regarded with doubt; European experts were consulted as to the methods, and the whole undertaking was looked on much as an experiment in a field fraught with danger. After 1820 life policies began more generally to take the place of annuities, which, however adapted to the condition of life in Europe, could not become profitable in a new country offering lucrative employment to capital. Agencies were employed, but the value of a life agency in those days is measured by the fact that the premium receipts of the Rochester agency of the New York Life and Trust from 1832 to 1846 were only $27,521. The first American treatise on the law of life insurance, by Phillips, was published in Boston in 1823.

That remarkable industrial expansion which took place in the ten years succeeding 1830, coupled with the limited operations of the few companies mentioned, seems to have led to renewed interest in life insurance. At least seven new companies were chartered in various cities in the six years subsequent to 1834, most of them combining a trust business; of these, three were in Philadelphia, and one each in Cincinnati, Mobile, and New Orleans. The strictly proprietary system which had been generally adopted in England down to 1820, had been followed in that year by the introduction of another, known as the mixed, which allowed the insured to share in a portion of the profits as the security of the business became better understood. Copying the example of the foreign companies, the new companies in the United States, most prominent among which was the Girard Life and Trust of Philadelphia, likewise adopted the mixed system. Some of the fire offices in New York, too, appear to have revived their life branches. Meanwhile experience had shown that the Northampton Mortality Table, on which the premium rates had at first been based, was grossly faulty in favor of the companies, and the English Carlisle Table of Dr. Milne had been substituted abroad. The same substitution was made in the United States. The premium rates of the new companies corresponded nearly with the present mutual rates. Whole-life policies, term insurance, children's endowments, and annuities were the principal contracts dealt in. The aspect presented by the business in 1840 was portrayed by a writer in *Hunt's Merchant's Magazine*, who, after remarking upon the inducements offered by the business, inquires why it is so little known and sought after, and adds, "It cannot be for want of safe and honorably conducted institutions, for in no country are they established on a firmer basis, with more salutary checks to guard against an abuse of their chartered privileges." Whether the great financial revulsion which had just taken place was the cause or not, the public refused to be educated up to the new undertaking; with the exception of the Girard little business was done by the new-comers, and the work was soon abandoned. That company too, has since turned its attention chiefly to trust funds. But the importance of the work was so far recognized that in 1840 a law was passed by the legislature of New York, which has since been copied into the statutes of most of the other States and of foreign countries, securing the benefit of policies to wives free from claims of the husband's creditors. The experience of all these companies was in truth merely preliminary to the real story of life insurance as an active and successful business in the United States. This story began with an act passed in New York in 1842 to incorporate the Mutual Life Insurance Company. The disturbed condition of fire insurance after the heavy losses of stock companies through the great fire of 1835 had attracted general attention to the mutual system. Mutual companies for fire purposes were being organized throughout the country. It was determined to apply the same system to life insurance. The thirty-six incorporators of the new Mutual numbered among them the most successful merchants of New York. No guaranty capital was provided, but in its place was a proviso that no policy should be issued until applications for $500,000 of insurance had been secured. Not satisfied with this amount, it was resolved to wait until double that sum had been subscribed. The delay, however, meant business; in less than ten months the entire amount had been pledged, and on Feb. 1, 1842, the Mutual Life opened its doors. No side issues, as heretofore, were allowed; the business of the company was confined to life insurance; and within nineteen months nearly 800 policies had been issued, of which more than one-half were for the whole term of life, about one-fourth were for the term of seven years, and the remainder for other limited terms. The surprising success of the new enterprise speedily invited competitors. In Massachusetts the chartered privileges of the New England Mutual, which had lain dormant since 1835, were revived, and that company, too, started in 1843. In 1844 the State Mutual of Worcester, Massachusetts, followed. In 1845 a charter originally granted four years before for a fire and marine company, to which life privileges were subsequently added, was utilized, and the Nautilus Insurance Company, now known as the New York Life, was launched. In this same year, too, the Mutual Benefit of New Jersey was added to the list. All of these companies were started on the mutual plan; those in Massachusetts, however, being compelled to add a guaranty capital. The Mutual Life rigidly adhered to the system of all-cash premiums. The others adopted what was known as the part-note plan; from 15 to 75 per cent. of the premiums being allowed to be paid in notes, which were made a lien on the policy and which it was expected would be in part at least cancelled by future dividends. This device was a prominent feature among the mutual fire offices, and had been introduced into some of the life companies of England. In 1846 the Connecticut Mutual, of Hartford, was added to the list, and, like the others, adopted the note plan. These six companies may be said to be the real progenitors of life insurance as it now exists in America; all that had gone before was mere pioneer work. They were started under sound and skilful management, and most of them have grown to be among the largest institutions of their kind. The Mutual Life, as it was the first, so it has continued to lead all the others in the volume of its business, and for some years has been the largest life company in the world. To this successful list of early companies, however, should be added some others. The Penn Mutual, started in 1847, is the leading life company in Pennsylvania, and the Union Mutual, started in 1849, is the representative company of Maine.

The beginnings of the business have thus been traced in considerable detail, but after 1850 its growth became so rapid that only the more important features can be noticed. Though the figures seem insignificant as compared with those of the present time, the progress of life insurance in the eight years following the organization of the Mutual Life was then deemed surprising. Fourteen of the principal companies in 1851 had about 40,000 policies in force, insuring $92,000,000, with aggregate assets of about $5,000,000. The aggregate business of the whole country at that time probably did not exceed 50,000 policies. In 1850 the temperance feature was introduced, and two companies were organized on a total abstinence platform. Legislative interference now began to be actively displayed. The first law requiring deposits was enacted in New York in 1851, and the first full returns from the companies were also exacted by that State. A year later similar returns were required by Massachusetts, and a board of commissioners was created in the latter State to supervise the business of foreign companies, whose jurisdiction was shortly after extended to all the companies. In 1855 the first special insurance department was created in Massachusetts, and Elizur Wright was appointed one of the commissioners in charge. From the example thus set by Massachusetts followed the present system of insurance departments throughout the country. Mr. Wright had formerly been a professor of mathematics, and having been engaged by the companies to do actuarial work, was thoroughly familiar with the principles of the business. This knowledge was at once put to effective use. Except by a few experts, almost nothing was understood concerning the conditions essential to the sound management of a company. Through his official reports Mr. Wright soon shed a flood of light upon this subject. Contrary to the prevailing English practice, he insisted that no company should be allowed to continue business which did not retain in its hands that portion of the premium receipts which was known as the net reserve, and actually compelled a prominent British company, after a bitter controversy, to withdraw its agencies from the State because it was deficient in this respect. The collapse of this institution shortly after added greatly to the reputation of Mr. Wright, and his principle, known as the net valuation method, became the one almost universally adopted among the States for testing the liability of life companies. The first non-forfeiture law was passed in Massachusetts in 1861 through the influence of this department.

The unlooked-for success met with by the mutual companies already mentioned produced several important results during the ten years after 1850. Greater confidence was felt by the public, and whole-life contracts were generally substituted for those of shorter terms. The companies, too, had gained more confidence and reduced their rates under the influence of competition. The mortality table of De Bow, prepared from the U. S. census of 1850, and that of Elliot from the census of Massachusetts five years subsequent, together with the publication of the vital statistics of the Mutual Life in 1857, and of the first American mortality table by the same company two years later, gave to the companies a better understanding of the character of American life. The premium-note plan began to disclose its weak feature in the dissatisfaction among those longer insured concerning the increasing cost of their insurance, which ultimately led to its abandonment, notwithstanding its attractive character. Competition, too, led to a large number of organizations after 1847, some of which were speculative in their character, and which were scattered among the principal cities in the North, South, and West. At least 40 companies, together with their English agencies, were prosecuting a life business in various parts of the country in 1850, some combining other branches. Of the new-comers only three attained permanent success; the demand for life insurance in the South and West was found to be too limited to sustain independent organizations there, and down to the present time a few large commercial cities in the East have been the chief centres of the business. For a number of years but few charters were granted.

The organization of the Equitable Life Assurance Society, in 1859, on a mutual basis, with a stock capital of $100,000, may be regarded as the beginning of another era in the progress of the business. In 1859 the New York insurance department was created, and, in conjunction with that of Massachusetts, led the way to the general system of State supervision which now exists. The outbreak of the war of secession for awhile tended to check the growth of life insurance, which had been rapid in the ten years' interval that preceded it. A large business had been built up in the seceded States by the northern companies; the inability or unwillingness of the holders to continue the premium payments rendered most of these contracts void according to their conditions. The question of war risks was one of the first embarrassments encountered, but was soon solved by a general agreement to grant war permits at an extra charge of from two to five per cent.; which afterwards proved abundantly adequate. The call of the government for loans was the next question. This, too, was promptly met by large investments in the new government bonds. Of the $10,000,000 of assets held by the companies two years before the war, less than one-tenth was in bonds of any description, while of $17,000,000 held by them in 1863, more than one-third was in U. S. securities. The increased taxation which followed the outbreak of hostilities fell upon the life companies as well as others. But the same embarrassing question arose as in subsequent tax measures on the part of the States. Any assessment of their reserve funds or their income would tend to impair their solvency. The matter was finally adjusted by a gross tax upon the premiums and a stamp tax on the policies. No sooner had public confidence recovered from the first shock occasioned by war, and business begun to adjust itself to the new channels, than life insurance resumed its growth. As was observed by a prominent daily journal at the time, this was a branch which seemed especially to thrive in periods of adversity. Strange to say, the increase of mortality among the companies on account of the war was scarcely perceptible, and there was little in the work of the companies to indicate the deadly struggle that was taking place. Competition was again vigorous. The introduction of the contribution plan of dividends in 1864, by Mr. Sheppard Homans, revolutionized the methods of dividing their surplus, which had formerly been modelled by the American companies after those of England. New features were introduced to make the contracts more attractive to the public. Endowments became a popular form of contract and were encouraged by the opposition of the Massachusetts department to what it termed the uninsurable period of old age. The ten-payment life policy was also introduced. Although experience had already shown some of the embarrassments of the part-note plan of premium, the opportunity thus afforded to furnish a larger amount of insurance for the same cash outlay induced most of the companies to favor it or a modification known as the loan plan, and vigorous controversies arose between these and such of the offices as insisted that the premiums should be paid wholly in cash. Rivalry among the agents, too, began to assume unwonted proportions.

The general business activity resulting from the great financial expansion towards the close of the war introduced an era of speculation in life insurance that was without precedent. In 1862 eighteen companies reported to the New York department, whose new policies issued in that year numbered 17,430. In the following year the companies had increased to twenty-two and their new policy issues to 35,224. This multiplication of companies and increase of business went on until 1870, when their number reached seventy-one and their new policies 237,180. Many of these new enterprises were located in the various western cities, and a goodly number of small offices must be added to the list which were not authorized to do business in New York; so that considerably over one hundred enterprises were at this time in operation in the United States. The business was prosecuted on the high-pressure system; the ingenuity of actuaries was taxed to devise novel plans of insurance. Rival solicitors flooded the cities and towns with their pamphlets and prospectuses. State departments multiplied, and conflicting State laws harassed the companies. The new business under such conditions was only secured at enormous expense. Although most of the new offices were mutual, State laws now required a guaranty capital, and this, together with the large volume of premiums, served for awhile to cover up the heavy expenditures. The idea of purely stock insurance was again revived, and in 1868 a mammoth stock enterprise for the sale of life insurance contracts, like any other mercantile commodity, at a fixed price, in which all the profits should go to the stockholders, was projected by the well-known banker Jay Cooke. The company was started with a capital of $1,000,000.

Business went on swimmingly among the new offices for awhile, but by 1870 the fever of speculation had begun to decline; then the effect of the excessive expenditures became evident. After 1871 the number of new policies yearly diminished; increased business no longer served to tide over extravagance; rigorous rules of the departments compelled a reserve fund to be on hand beyond what most of the new companies had been able to retain from their premium receipts; their capitals were no longer adequate to supply the deficiency, and failures among them began. Down to this time public confidence had been almost undisturbed by failures. The companies that had retired had generally been those that were unable to obtain business or had satisfactorily disposed of their few contracts. It was a popular doctrine that downright failure, without gross mismanagement, was impossible; but the results which now began to flow were a rude shock to this confidence. Between twenty and thirty of these new enterprises disappeared within five years after 1870, and the list of offices throughout the United States that have retired since this latter date numbers more than eighty. The majority of these retired and reinsured their risks; but enough among the number were downright failures, attended with losses more or less severe, to impair confidence in the business and to engender a spirit of unfriendly criticism. Resistance to claims on the part of some of the companies, and consequently litigation, increased as their financial prosperity declined. Harsher legislation followed on the part of the States. One of the most important questions raised during this period was concerning the rights of policy-holders in the South whose contracts had lapsed through the war.

The answers of the courts were not harmonious, and depended on the varying circumstances of the individual cases; but the general conclusion reached was that where the insured was in no way in fault he was entitled to an equitable surrender value. After public excitement over the repeated failures had subsided and the facts were calmly investigated, it was found that the alarm had been ill grounded. With few exceptions the failures had been confined to new and speculative offices whose business had been procured only at an excessive expenditure, and whose total amount, notwithstanding their numbers, was comparatively small. In every other case it could be traced to gross mismanagement. The actual amount lost by the policy-holders has been estimated at less than 2 per cent. of their investments in life insurance contracts down to this time. The older and better established companies, with few exceptions, weathered the storm without trouble.

One outgrowth of the excitement, however, was a wide-spread prejudice against the accumulation of funds and the demand for insurance at current cost. This led to the general introduction of what is known as co-operative or assessment companies, based on the collection of assessments from members to pay death losses as they occurred. There being no capital required, no legal responsibilities assumed, and no restraining laws in the way, these associations multiplied rapidly in the different States, especially in the rural districts. For the most part they were controlled by parties unfamiliar with the principles of insurance, assumed cheapness being their chief attraction, and were often fraudulently conducted. Their failures, in consequence, became a source of public scandal, until restrictive laws were interposed and more intelligent management became infused into the system. But it is now claimed that the defects of the earlier organizations have been overcome.

Speculation in life insurance has never revived since 1870; the business gradually settled down into the hands of a limited number of strong companies, by which it has been conducted on sound commercial principles, and whose operations have steadily increased in magnitude until several of them can boast of 50,000 policies each in force and over $100,000,000 insured, while the largest of the number has over 100,000 policies in force, insuring more than $300,000,000, with more than $100,000,000 of accumulated assets; and some of the others are fast approaching these figures. Within recent years a few of these companies have extended their agencies into foreign countries and are doing a prosperous business abroad. The recent introduction of what is known as Tontine insurance has added largely to the business of some of the companies, the scheme having met with liberal favor among the insuring classes. The strongly established business of these companies, and the obstacles interposed by existing laws in the way of new enterprises, have prevented any late attempts to add to their number.

The growth of life insurance in the United States has been largely influenced by, and has kept pace with, the phenomenal growth of the country itself in wealth and population. As these latter have increased, and the individual opportunities for a profitable employment of money have diminished, the danger of a sudden reversal of fortune, or the importance of a provision against early death, have become more strongly impressed upon the people; and life insurance has constantly grown in popularity as a means of investment, not simply among those of moderate means, but among large capitalists, who seek in this way to secure a provision for their families beyond the reach of ordinary business reverses, an object which has been greatly facilitated by the legal protection of the policy against the claims of creditors. While the amount of the average life policy is about $2500, single policies have sometimes been issued for $50,000 of insurance. The policy is held to be the property of the beneficiary, no matter by whom procured or paid for. Any breach of the conditions of insurance in matters of vital importance, such as failure to promptly pay the premium when due, or a gross misstatement of facts regarding age, or health, will forfeit the contract unless such forfeiture has been waived. But all acts on the part of the company, or its representatives, which will justify the insured in believing that any breach of contract has been excused, will amount to a waiver. The rights of the insured are vigilantly protected both by the law and the court, except in cases of insolvency, where the legal provisions have generally proved inadequate. Companies, when found to be insolvent, have been placed in the hands of receivers under the jurisdiction of the courts, and the expenses of winding up the business in such cases, combined with the litigation involved in determining the rights of the respective classes among the members, have been found to absorb a large percentage of the funds remaining. Laws have been passed by some of the States especially to remedy this evil.

Nearly all the life insurance business in the United States has been done by the companies making returns to the New York State department, and the following figures, compiled from those returns, will show its growth during the last quarter of a century and its present magnitude:

Year.	Number of companies.	Assets.	Income.	Payments to policy-holders.	Number of policies in force.	Amount of insurance in force.
1860	14	$24,115,687	$5,998,144	$2,101,802	56,046	$163,703,455
1865	30	64,232,123	24,887,020	6,292,036	209,392	580,882,253
1870	71	269,520,441	105,026,148	44,949,257	747,807	2,023,884,925
1875	45	403,145,982	108,645,084	65,489,810	774,625	1,922,043,146
1880	34	428,332,871	77,403,445	53,127,192	*860,219	*1,524,609,743
1885	30	523,664,678	105,527,865	61,218,752	814,691	2,023,517,488

* Including Industrial Insurance.

These thirty companies now doing business in New York have collected in premiums since their organization, $1,328,460,718, and have returned to policy-holders or paid out for claims, $958,490,934.

This vast business has been built up and is carried on almost exclusively through agents, and the agency fields of most of the companies not only include the principal States at home, but in the case of a few have been extended to Canada, Europe, and even as far as Australia. The field is usually divided among general agents, who exercise jurisdiction within their several territories and have local solicitors in their employ. Sometimes separate departments are created, covering a large territory, under the control of managers; but the power of the life insurance agent is usually limited, whatever his jurisdiction. Unlike the fire insurance agent he has no authority to make contracts, nor, as a rule, to alter their stipulations; his power extends only to receiving applications, collecting premiums, and acting generally as an intermediary between the company and its members. The right to issue and alter contracts is reserved by the home office. The agents are generally paid by commissions, fixed according to the amount of premiums and character of the policy; the principal commission being allowed on the first premium and a small percentage on those subsequent; sometimes these commissions are commuted by a single brokerage. As the members have a vested interest in the companies, the life agents can exercise but a limited control over business once secured.

Most of the business is done on the mutual plan, either without a capital, or with a guaranty capital restricted to legal dividends. In a few the profits are divided between the stockholders and the insured. The control of the purely mutual companies is vested in the policy-holders, by whom the directors are annually elected. The work of the companies practically divides itself into several departments, each of which, in the larger companies, is under separate management, subject to the general control of the board of directors. The finances of the company are usually looked after by the president and a committee of the board; these are the most important among the responsibilities assumed, and the most carefully guarded by legislation. The investments are generally restricted by law to the most approved classes of public securities and to collateral loans on such others as have a good market value in excess of the loan, and to real estate mortgages; real estate holdings are restricted to buildings needed for office uses, and to foreclosures. The character of the investments is subject to examination by the insurance officials of the States in which business is done. Over one-third of the invested funds of the companies are in mortgages, and nearly another third in stocks and bonds. For a number of years the decreasing demand for loans in the older States, and the diminishing interest rates on these and other securities, have led to increasing investments in the newer sections of the West, where higher interest can be obtained. Loans are effected largely through special agents, employed for the purpose.

The insurance part of the business is under the care of the actuarial department; the actuary is the mathematician and chief accountant of the company, to whom is intrusted the fixing of the premium rates, the devising of new plans of insurance, determining surrender charges, reserves, dividends, and such other matters as require mathematical computation. The classes of contracts mostly dealt in are either ordinary whole-life policies, endowments, or Tontine life policies. The first class, which constitutes the larger part of the business, is usually on the basis of an annual premium, either for life or for a term of years. Endowments are either contracts payable at the end of a certain term to the party, if living, or more generally either at the end of the term or in case of previous death. The Tontine contracts allow the surplus, which would otherwise be divided, to accumulate for a term of years, at the end of which it is divided among those of the class who survive and retain their policies in force. In purely Tontine contracts the entire policy is forfeited in case of previous abandonment, but in what is known as the semi-Tontine, only the surplus is thus forfeited. The premium rates are determined according to the actual cost of carrying the insurance, with an addition called "loading" for expenses and contingencies. Competition in life insurance does not seriously affect the prices charged, because the surplus is returned to the insured, and the requirements of the State departments render it difficult to do business with inadequate premiums. The Actuaries' Table, of England, and the American Experience Table of the Mutual Life, with interest at 4 per cent., are the bases of computation generally adopted both by the companies and the State departments in their calculations, with a loading of from 10 to 30 per cent., according to the kind of contract. The premium, except in limited-payment life policies, when a part is sometimes received in notes, is required to be paid in cash in advance.

The question of surrender charge has always been one of the most troublesome with which the companies have had to deal. Legislation, in several of the States, interposes to prohibit forfeitures and to fix the terms under which the companies must accept policies offered for surrender. The companies themselves now generally stipulate to accept such a surrender; but the equities of the parties in such case and the effect of withdrawals upon the companies are questions upon which no two actuaries will thoroughly agree, while the laws upon the subject have been notoriously inequitable.

The determination of the amount which shall be held by the company as a reserve or offset to its liabilities under its policies, and the amount which may be safely distributed, in dividends, is the central feature of the actuary's work. State laws fix the minimum of reserve which the companies must hold, requiring it to be equivalent to the present net value of the policies, according to a given mortality and interest table, as stated above. This method, which is known as the net-valuation system, is one of the peculiar characteristics of American life insurance which has exerted a strong influence on its practical workings and some on its legal status. Actuaries generally, both in America and Europe, recognize the fact that the commercial solvency of a company can only be determined by balancing its total assets, either present or prospective, against its total obligations, and this is the principal rule used abroad for ascertaining the financial condition of the company.

But in consequence of the opportunity furnished under this method, known as the gross-premium plan, for excessive expenditures in the earlier years of the business, the State departments began to insist that the premium charged should be separated into two parts, and the portion required to meet the cost of insuring should be retained and applied solely to the settlement of claims, while all other expenditures should be met from the balance. This is the essence of the net-premium method, by which the valuations of the companies' reserves usually are made. The funds in hand must always be sufficient, together with this net portion of the premium receivable, to meet future claims. The effect has been to impart a savings-bank aspect to many features of the business and to impress equities upon the funds in the interest of the individual policy-holders. All excess of funds above this legal reserve is popularly treated as surplus, which, after reserving an adequate amount for contingencies, may fairly be divided among the policy-holders. Those desiring to withdraw are regarded as entitled to a certain portion of their interest in this reserve, after allowing for the assumed damage done by their withdrawal. In Massachusetts, however, this surrender charge is now based on the last-mentioned element. The heavy percentage of lapses among policies which had run but a short time, and the strong popular feeling of injustice done by the total forfeiture of the amounts already paid, have induced the companies to voluntarily stipulate for the payment of such surrender values and have spurred on legislation to compel it. Except where fixed by the law, however, each company adopts its own rules. About 40 per cent. of the new business of the companies annually is found to be offset by these lapses, and one of the arguments advanced in support of the Tontine form of policy has been its tendency to discourage such discontinuances.

The dividend principles of the American companies are based on a similar analysis of the source of surplus. Originally, as in Europe, dividends were determined according to a percentage, either of the payments or sums insured, but of recent years what is known as the contribution plan, first devised by the actuary of the Mutual Life in 1863, has been universally substituted. According to this plan the actual cost of insuring each member, according to the actual mortality and interest rate realized during the year, is computed, and the amount of his contribution to the surplus as thus ascertained furnishes the basis for the division. The surplus, as thus analyzed, arises from a variety of sources. The first, and until recent years one of the most important sources, was the excess of interest realized over that assumed in the calculations. The gain from higher interest rates has always been the advantage claimed by the American companies over foreign competitors; until recent years 6 and even 7 per cent. were confidently calculated on, but the general fall of interest throughout the country has reduced these figures to about 5 per cent., while it has compelled the companies to withdraw their investments from many classes of securities formerly deemed desirable. Still the interest earnings continue much higher than abroad, and in view of the resources of the country still undeveloped are expected to continue so for years to come.

The second source of surplus in American companies is a low mortality. Here, too, except in the case of unsuccessful companies, where the withdrawal of sound lives has left an excess of members in impaired health, the experience has been generally favorable, the deaths sometimes amounting to less than 80 per cent. of the number expected. As this result has been mainly due to the fact that only sound lives carefully selected have been admitted, it must gradually disappear as the new business secured each year becomes less in proportion to the membership, for the influence of such selection disappears after about six years; nor is it certain that this source of surplus is not in a measure fallacious, and that an increased mortality may not later offset the reduction.

Reduction of expenses, together with lapses and surrenders, furnishes a third source of gains. The early years of a company's business and a large amount of new business involve heavy outlays for procuring the insurance, which disappear as the policies grow older. Expenses have ranged from $5 to $15 per annum for each $1000 insured, according to the age of the company. A low ratio of expenses, as well as of mortality, is often cited in favor of a company, though it is an uncertain guide, the real question being whether the new membership has been secured on terms which in the long run will prove profitable to the policy-holders. In fact it is impossible to formulate any fixed standard for measuring the rival merits of American life-offices. Gains from lapses, too, may be offset by depressed vitality among those remaining. Whether surrenders should be paid for in cash or in continued insurance has long been a mooted point, and both methods have been adopted. Dividends are now paid annually in cash or in an equivalent reduction in the premiums, except in the Tontine class of policies, where the system is somewhat analogous to that formerly adopted here and still largely adhered to abroad, of declaring dividends only at the end of a term of years.

Such are some of the more prominent features of the actuarial work of the ordinary American life companies. Experience has shown that while the mortality among American insured lives follows a somewhat different law from that of England, the two are so nearly alike that the English tables may be properly applied to American business, though American tables are often preferred. Legislation has been freely invoked to liberalize the features of the contract in favor of the insured, and the companies have voluntarily relieved the policies from many of their harsher features. The principle of non-forfeiture, except in Tontines, is nearly universal. Some policies are made indisputable after a certain period. The courts by their rulings have virtually made suicide clauses and prohibitions against evil habits of little effect. Restrictions as to residence have also been modified. The terms of the contract are regarded in law as one-sided and to be construed most strongly in favor of the insured.

The following table shows the premiums charged at different ages by one of the principal mutual offices for ordinary life and endowment policies:

Annual Premium to Secure the Payment of $1000.

Age....................	25.	30.	40.	50.	60.
Ordinary whole-life policy.........	$19.60	$22.36	$30.84	$46.50	$76.52
Whole-life policy in twenty years premium payments........	27.31	30.27	38.65	52.86	79.71
Endowment policy for ten years or previous death..................	103.60	104.33	106.29	112.10	127.59
Endowment policy for twenty years or previous death..........	47.46	48.48	51.85	60.20	

Another most important department in a life company is that of the medical examiner. Local medical examiners are usually appointed in all the larger agency fields, while in other districts reliance must be placed on some resident physician. These, under instructions, make the examinations and reports, which are afterwards submitted to the scrutiny of the chief medical officer at the home office before the risk is accepted. The relative tendency of diseases to develop at different ages, and their influence upon the probable after-life of the applicant, have been so thoroughly studied that the responses to the inquiries, if truthfully made, will generally show the physical character of the applicant, and none are received unless they appear to be sound lives. Experience has shown that in America it is extremely difficult if not impossible to fix proper premium rates for those whose lives are impaired.

Another plan of life insurance is carried on by a company under the direction of Mr. Sheppard Homans, formerly actuary of the Mutual Life, intended for those who object to paying more for their insurance each year than its actual cost, as they must do in all companies which charge only a uniform premium, and are therefore compelled to accumulate a reserve to meet the increased mortality of later years. Under this plan the premium increases from year to year, according to the increasing rate of mortality at the advancing age.

Industrial insurance for the benefit of the poorer classes has recently attained large proportions in the hands of a few companies either wholly or in part engaged in this branch. The contracts are for small sums, and the premiums are usually collected in the shape of weekly payments. The plan is essentially modelled after that of the Prudential Office in England. The insurance is regarded rather as of a temporary character and no large reserve is deemed necessary. The children of the poor in many of the principal cities are insured in large numbers under this system. The four companies reporting to the New York department at the close of 1885 had 1,377,150 such policies in force, insuring $146,138,241.

What is known as assessment or co-operative insurance has attained enormous proportions in the United States during recent years, and has taken a strong hold among those possessed of limited means. The fundamental conception of this plan is the assessment of the members of the company for the payment of death claims as they arise, thereby doing away with the necessity of a large accumulation and limiting the payments of the members to the current expenditures of the business. The difficulties which have been experienced in the way of securing reliable insurance or permanence in the organization have led officials and insurance experts to regard the plan with considerable distrust, and to insist that it should only be permitted under stringent legislative restrictions; but those engaged in it claim that the defects in its former workings have been largely overcome through improved methods, and a strong pressure of public sentiment has compelled its recognition as a distinct and legitimate branch of life insurance, to be controlled by laws suited to its peculiar character. The societies are essentially co-operative in their organization, and usually without any pecuniary responsibility beyond the limited contributions collected from the members as occasion may require. For these reasons their organization by irresponsible parties and lax management have been facilitated, while the uncertainty regarding the amount and times of payment, absence of any vested interest in accumulated funds, and the increasing cost with advancing age, have produced a rapid abandonment of membership upon the occurrence of dissatisfaction. The amount which could be realized on a claim, being dependent on the assessments collected, has proved uncertain, and multitudes, some of a fraudulent character, have been disbanded after an experience of a few years. But under improvements suggested by this experience and better laws it is claimed that these difficulties have been in large measure overcome. Unlike the ordinary life policy the contract usually known as a certificate of membership stipulates not for the payment of a definite sum, but for an amount dependent upon the assessments collected from the members, and usually naming a maximum sum. Some of these societies, however, undertake to guarantee a fixed payment, and where this is done are generally regarded by the law as ordinary life companies. The premium, too, known as the assessment, instead of being for a definite amount, payable at regular intervals, is determined by the occurrence of death claims. The amount of the assessment for such claims is variously regulated; the members are divided into classes according to ages; in some a member continues in the class in which he first entered, and his assessments thereafter remain fixed regardless of age; in others he is changed from one class to another, and his payments increased at intervals of ten years as his age increases; in others again the assessment is increased each year according to the age of the member. The expenses are assumed to be independently provided for by admission fees and annual dues. The absence of any accumulated fund was one of the fundamental conceptions of these associations, but experience soon proved that a small fund, at least, to meet emergencies was essential, and the importance of a limited reserve fund is now generally recognized by the more prominent assessment companies. The theory on which they are conducted is that of a community in which it is assumed that after a certain time the deaths and withdrawals will counterbalance the effect of increasing age, and the average age of the members will remain the same. The rates were formerly adjusted from the average annual deaths experienced by life companies, but under a more intelligent comprehension of the subject are now determined from the ordinary mortality tables in use among the latter. Since no reserve fund is required the interest element does not enter into the calculations. It is obvious that, theoretically at least, the payments of the members must in the long run be larger because there are no interest earnings; but the associations claim that this disadvantage is offset by conducting the business at smaller cost. The following table will show the rates charged by one of the largest of these associations, which also charges annual dues of $2 for each $1000 insured, and an admission fee ranging from $8 for $1000 of insurance to $30 for $10,000 of insurance. The rates increase from year to year, but are given in the table only for intervals of five years for each $1000 of insurance; the number, of course, depending on the number of deaths:

Age	25.	30.	35.	40.	45.	50.	55.	60.	65.
Rate of assessment	$1.00	1.10	1.24	1.44	1.64	2.00	3.25	4.50	7.00

The following statistics relative to the magnitude of the business in the United States were presented at an annual convention of assessment companies in 1885; they include, however, many that are, more strictly speaking, benevolent societies:

Number of companies	430
Number of membership	1,655,975
Amount of insurance in force	$3,785,163,363
Amount of assessments collected during the year	$23,856,942
Amount of death losses paid during the year.	$22,932,056
Expenses during the year	$3,557,052
Assets at close of the year	$8,238,635
Number of deaths during the year	9,563

Both the law and the courts make a distinction between the assessment insurance company and the beneficial association, which it closely resembles. In the latter societies, which are also very numerous, the members are bound together for mutual aid by some common tie, and the insurance feature is but an incident of their work.

The distinguishing characteristic of the life insurance system in the United States is the rigid supervision exercised over it by State departments acting under State laws. Full details relative to their business must be rendered annually to the departments, concerning the nature and amount of their investments and their liabilities, their various sources of income and expenditure, and in some cases a complete record of all their policies in force, so that the obligations under their contracts can be computed by the State actuary, and the standing of each company can be determined by the returns. In addition, the officials are authorized to make a personal investigation of the affairs of each office when deemed necessary, and if the condition be such as to render the further prosecution of business unwise, to institute legal proceedings to compel the increase of financial strength or to wind up its business. The courts, too, as the result of a large amount of litigation extending over many years, have constructed a body of jurisprudence regarding the insurance contract more ample in its scope and more thoroughly digested than in any country of Europe. The literature of the business, too, in all that relates to its practical workings, is more ample and complete in America than elsewhere. The mortuary experience, whether as regards the death rate or diseases, has been thoroughly studied and digested; the familiar principles have been explained in thousands of books and pamphlets.

While the literature of life insurance in the United States has received but small additions in the shape of profound mathematical analyses, such as have characterized the labors of English actuaries, in respect to all those matters which relate to its daily practice as a business pursuit it is unsurpassed. As respects vital statistics, in addition to the publications already mentioned, the Mutual Life within a few years has made the most exhaustive investigation of its experience, both medical and actuarial, that has ever been attempted by any single company. Most of the other larger companies have followed the same example. The *Life Table* constructed by Dr. Farr from the British census returns has its counterpart in a similar table prepared by Mr. Meech from the American census; and the *Actuaries' Table of England*, constructed from the combined experience of the life companies there, also has its counterpart in a similar table constructed from the combined experience of the American offices. Monographs touching the scientific features of the business scattered through various publications would, if compiled, furnish several volumes. In no country in the world are so many periodicals devoted to its discussion or its relations to journalism so thoroughly recognized. In no other country have so many standard works of reference been published on the law of the life insurance contract.

One of the most valuable contributions to the literature of life insurance is the combined experience of 30 American offices referred to in the preceding paragraph. This table is based on observations upon 1,027,529 lives, insuring $2,657,308,000. It was compiled by Mr. L. W. Meech, under the direction of a committee of actuaries. It shows the mortality among insured lives, the mortality by sexes, by localities, and by years of insurance, as well as the rates of financial loss to sums exposed. It also embraces a classification of causes of death, in general and by locality. The results deduced from this table for Northern States do not vary widely from the experience of the English offices.

The following is the standard American table of mortality used by the life companies, showing the number of living at the beginning of each year of age, and the deaths during such year, starting with 100,000 assumed to be alive at the age of ten; together with the expectation of life or number of years on an average that an individual may be expected to live at each age. The last element is of no practical use in ordinary life insurance, but it is applicable to assessment insurance, and in some cases to the valuation of life interests:

AMERICAN TABLE OF MORTALITY.

Age.	Number living.	Deaths each year.	Expectation of life.	Age.	Number living.	Deaths each year.	Expectation of life.
10	100,000	749	48.72	53	66,797	1,091	18.79
11	99,251	746	48.08	54	65,706	1,143	18.09
12	98,505	743	47.45	55	64,563	1,199	17.40
13	97,762	740	46.80	56	63,364	1,260	16.72
14	97,022	737	46.16	57	62,104	1,325	16.05
15	96,285	735	45.50	58	60,779	1,394	15.39
16	95,550	732	44.85	59	59,385	1,468	14.74
17	94,818	729	44.19	60	57,917	1,546	14.10
18	94,089	727	43.53	61	56,371	1,628	13.47
19	93,362	725	42.87	62	54,743	1,713	12.86
20	92,637	723	42.20	63	53,030	1,800	12.26
21	91,914	722	41.53	64	51,230	1,889	11.67
22	91,192	721	40.85	65	49,341	1,930	11.10
23	90,471	720	40.17	66	47,361	2,070	10.54
24	89,751	719	39.49	67	45,291	2,158	10.00
25	89,032	718	38.81	68	43,133	2,243	9.47
26	88,314	718	38.12	69	40,890	2,321	8.97
27	87,596	718	37.43	70	38,569	2,391	8.48
28	86,878	718	36.73	71	36,178	2,448	8.00
29	86,160	719	36.03	72	33,730	2,487	7.55
30	85,441	720	35.33	73	31,243	2,505	7.11
31	84,721	721	34.63	74	28,738	2,501	6.68
32	84,000	723	33.93	75	26,237	2,476	6.27
33	83,277	726	33.21	76	23,761	2,431	5.88
34	82,551	729	32.50	77	21,330	2,369	5.49
35	81,822	732	31.78	78	18,961	2,291	5.11
36	81,090	737	31.07	79	16,670	2,196	4.74
37	80,353	742	30.35	80	14,474	2,091	4.39
38	79,611	749	29.62	81	12,383	1,964	4.05
39	78,862	756	28.90	82	10,419	1,816	3 71
40	78,106	765	28.12	83	8,603	1,648	3.39
41	77,341	774	27.45	84	6,955	1,470	3.08
42	76,567	785	26.72	85	5,485	1,292	2.77
43	75,782	797	26.00	86	4,193	1,114	2.47
44	74,985	812	25.27	87	3,079	933	2.18
45	74,173	828	24.54	88	2,146	744	1.91
46	73,345	848	23.81	89	1,402	555	1.66
47	72,497	870	23.08	90	847	385	1.42
48	71,627	896	22.36	91	462	246	1.19
49	70,731	927	21.63	92	216	137	.98
50	69,804	962	20.91	93	79	58	.80
51	68,842	1,001	20.20	94	21	18	.64
52	67,841	1,044	19.49	95	3	3	.50

(W. S. N.)

LIFE ANNUITIES—FIRST PAYMENT IMMEDIATE.

American Experience Table of Mortality—Interest 4 *and* 6 *per cent.*

Age.	4 per ct.	6 per ct.	Age.	4 per ct.	6 per ct.	Age.	4 per ct.	6 per ct.	Age.	4 per ct.	6 per ct.
10	20.414	15.293	32	17.973	14.154	54	12.628	10.786	76	5.505	5.157
11	20.343	15.265	33	17.806	14.064	55	12.307	10.556	77	5.219	4.908
12	20.269	15.236	34	17.632	13.969	56	11.982	10.321	78	4.936	4.660
13	20.192	15.204	35	17.451	13.870	57	11.653	10.081	79	4.656	4.413
14	20.112	15.171	36	17 263	13.765	58	11.321	9.836	80	4.380	4.467
15	20.028	15.137	37	17.069	13.655	59	10.985	9.586	81	4.108	3.924
16	19.942	15.100	38	16.868	13.540	60	10.648	9.332	82	3.842	3.683
17	19.851	15.062	39	16.659	13.418	61	10.309	9.074	83	3.580	3.445
18	19.757	15.021	40	16.443	13.291	62	9.969	8.813	84	3.318	3.205
19	19.660	14.978	41	16.220	13.157	63	9.630	8.549	85	3.057	2.964
20	19.558	14.932	42	15.988	13.017	64	9.290	8.283	86	2.799	2.724
21	19.452	14.885	43	15.749	12.870	65	8.952	8.016	87	2.548	2.488
22	19.342	14.834	44	15.502	12.716	66	8.616	7.747	88	2.310	2 263
23	19.228	14.781	45	15.248	12.555	67	8.282	7.479	89	2.085	2.050
24	19.109	14.725	46	14.985	12.386	68	7.952	7.212	90	1.867	1.842
25	18.985	14.666	47	14.714	12.211	69	7.627	6.945	91	1.654	1.637
26	18.857	14.604	48	14.436	12.028	70	7.307	6.681	92	1.454	1.443
27	18.723	14.538	49	14.151	11.838	71	6.993	6.420	93	1.291	1.285
28	18.585	14.469	50	13.858	11.640	72	6.685	6.163	94	1.137	1.135
29	18.440	14.396	51	13.559	11.436	73	6.383	5.908	95	1.000	1.000
30	18.291	14.320	52	13.255	11.226	74	6.086	5.656			
31	18.135	14.239	53	12.944	12.009	75	5.794	5.406			

It is often necessary to compute the values of widow's dower or other series of uniform payments which are to continue during life. We give on the preceding page, below the American table of mortality, the value of life annuities computed upon this table, with interest at both 4 per cent. and 6 per cent., the payments upon which are to begin at the commencement of the year. It often happens that the first payment is required for the end of the year, in which case the value must be taken at one unit less than given. For example, the annuity at 4 per cent., the payment of which is immediate, is 18.291, but if it is to be paid twelve months hence it would be 17.291. The value of an annuity of any required amount can be determined by multiplying that amount by the value given opposite the proper age in the table.

Marine Insurance.—In America as in Europe the perils of the sea were the first in point of time to call attention to insurance. Before the Pilgrim fathers had landed at Plymouth Rock, or Capt. Smith had established himself in Virginia, the practice of marine insurance was common among the merchants of England. Corporations for the purpose were unknown until a hundred years later, but the business was done by the merchants themselves subscribing or underwriting the amount which they were willing to insure on each other's ventures. The vessels and their cargoes between the mother country and her American colonies were thus covered by their owners at home. But for the first hundred years there was little demand for insurance on the part of the colonists themselves. By the beginning of the eighteenth century, however, a few commercial towns in the colonies had attained considerable importance, and felt the need of protection for their risks on the high seas. For some time thereafter the American merchants and traders were compelled to apply to the London underwriters for their insurance; they were too few in number, too scattered and deficient in capital to protect each other. In 1721 the first attempt was made to effect a combination among American merchants to do their underwriting at home. This was a proposal by one John Kopson, of Philadelphia, to open an office in that city on the plan of the London Lloyds, reciting as a reason the inconvenience of being obliged to send to London and the precariousness of the dependence. The advertisement of Kopson's scheme appeared in a newspaper in that city, but met with no success; other similar attempts were followed by failure. (A pamphlet in advocacy of one of these plans is said to be the first work printed by Benjamin Franklin.) But in 1759 the Old Insurance Office, as it was called, was fairly established in New York, and it was speedily followed by rival organizations. Until about the beginning of the present century nearly all the marine insurance in America was thus done by the merchants individually assuming each for himself a share in risks offered at these insurance offices.

The first American corporation to undertake the business of marine underwriting was the Insurance Company of North America, in Philadelphia, in 1794, followed four days later by the Insurance Company of the State of Pennsylvania, in the same city. The example was quickly imitated in the other leading commercial ports. Boston, New York, Charleston, and Newburyport within a few years had corporations organized for insuring marine risks. The close of the American Revolution had relieved American shipping from the dangers of hostile cruisers, while the great struggle on the continent of Europe, by subjecting foreign shipping to the same perils, threw a large share of the carrying trade of Europe into the hands of American vessels. Such were the circumstances which gave the first great impetus to marine insurance in this country, and directly led to the organization of the companies just mentioned. Within two years of its organization the company first spoken of had received over $2,000,000 in premiums, though its business was chiefly confined to Philadelphia. These corporations rapidly absorbed the business, and by 1826, as Chancellor Kent declares, individual underwriting was almost extinct.

In this, as in other matters, the method of business was generally modelled after that prevailing in the mother country. Fire insurance was frequently incorporated with the marine branch. Another advantage gained by the United States from foreign wars was the establishment of a distinctly American system of insurance law. In no other country of the world has such a body of jurisprudence been collected on the subject of insurance as in America, and its beginnings are clearly traceable to the multiplied legal disputes arising from our increased commerce. Under the influence of the disturbed condition of affairs in Europe, about 10 charters including marine privileges were granted in the various States prior to 1800, and more than 50 in the twelve years which followed, although these chartered privileges were by no means all availed of. The outbreak of the second war with England, in 1812, and the return of peace to Europe combined to deal a serious blow to this growing trade, from which it did not rally for several years, and the marine business of course shared in the depression; only about 12 charters were granted from 1812 to 1820, and about 20 more in the next decade. Heavy losses, too, were suffered through depredations upon our neutral ships on the part of foreign cruisers. The growth of the business was soon attended with the usual drawbacks to insurance; fraudulent losses became common; wreckers on scantily settled portions of the coast, notoriously in Southern Florida, combined, and for years were the terror of the companies. They were aided by indifference of merchants and popular prejudice against the companies. Competition, too, came in to reduce the profits. While the business remained in the hands of individual merchants there was virtually no competition; each subscriber demanded sufficient remuneration for his risk. When the companies were first organized the capital was still for the most part in the hands of the merchants whose risks were insured. But gradually the insurers and insured became separate in their interests, large dividends attracted competitors, the individual underwriters were driven from the field, and demoralization followed. New York in 1830 had no less than 8 marine companies, which, upon a capital of about $3,000,000, paid $400,000 in dividends. Another effect of the liberal profits from the business was the establishment of mutual companies by the merchants, generally with a stock capital for additional security, in order that they might obtain lower rates. Numerous failures and the loss of a large amount of insurance capital resulted from these causes in the twenty years preceding 1840. The experience of one old New York company from 1817 to 1834, inclusive, showed that with a total premium income of $367,507 during that period, it had met with losses exceeding that amount by $68,670, and the experience of 15 offices during the years 1831 and 1832 showed about $75,000 of loss above premiums of $500,000. Insurance stocks, which had formerly been looked on as safe investments for trust funds, were now universally discredited. By the year 1840 the experience had become so disastrous that organized efforts were made in Philadelphia and elsewhere by underwriters to place the system on a sounder basis, and thus was begun that plan of joint co-operation among insurers for a common benefit that has since extended to other departments of insurance, and has proved such a potent factor in shaping the business. Another result of the difficulties with France and England in the early part of the present century was a distrust of foreign insurance contracts. Several States passed laws prohibiting foreign agencies, which, on account of the scarcity of home capital, were extensively relied on; and so late as 1829 New York enacted a prohibitory law against such foreign marine agencies and against bottomry.

Between 1830 and 1840 occurred that remarkable development of commercial and speculative activity which culminated in the great financial panic of 1837. In sympathy with the movement about 50 additional charters were granted during those years; though, as before observed, only a limited proportion of these companies were ever actively organized for business, and their distribution was chiefly among the more important maritime ports.

Two successive fires in New York, in 1835 and again in 1845, contributed to produce some important changes in the marine business. The destruction of numerous stock fire companies, some of which had combined a marine business, led to the separation of the latter and to the organization of companies on the mutual system. Previous to this time comparatively little attention had been directed to the subject by the various legislatures. Taxation of insurance began in New York as early as 1823, and six years later was extended to discrimination against foreign agencies; but the corporations had hitherto been created only by special charters, usually conservative in their provisions, and little legislation was called for. Now the numerous failures of banking and insurance corporations suggested the importance of more stringent supervision. The multiplication of local corporations, to take the place of those which had failed, led to efforts to protect and encourage such organizations. From 1840 onward discriminating taxation against agencies from other States became prevalent. General laws regulating the formation and management of companies took the place of special enactments in New York in 1849, and the system gradually extended to other States.

Meanwhile a new department, closely allied with ocean marine underwriting, had acquired great prominence. The settlement of the interior portions of the country and the introduction of steam had developed a large and growing inland commerce, first upon the principal rivers, and, after the completion of the Erie Canal, upon the great lakes. Thus inland marine underwriting became a prominent feature of the business of many of the fire as well as some of the strictly marine offices. On the rivers, of course, perils of the sea were comparatively small, and the business had many features in common with the ordinary fire risk. On the lakes, however, the risks were more truly of a maritime character, and the companies engaged met with a discouraging experience. Owing to their limited area a single severe storm would affect the whole body of water, and the consequent disasters would often absorb the insurance profits of a whole season. This feature has always given a strongly speculative character to the lake business, and has tended to a reckless competition among the companies. The losses became so great that in 1855 an organization was formed, known as the Lake Underwriters' Association, which in a measure checked the evils, and since that time the lake underwriters have endeavored to combine to regulate the business, though with indifferent success, for in no other department are the conditions so favorable to the development of the gambling element in insurance. Until the last thirty years this inland marine business in the West was conducted chiefly through the agencies of Eastern companies, and until 1830 was insignificant. In its present magnitude the inland insurance of the United States completely overshadows that upon ocean risks.

Official returns of their business were exacted of the marine companies in Massachusetts as early as 1843, but except in the cases of those organized under general laws none were required in New York until the formation of the insurance department in 1861. These two States led the way in the official supervision of the business. Increased losses between 1850 and 1860 had led to increased ocean marine rates; but meagre attempts had been made to analyze the causes or seek for other remedies. There had been little or no combined effort on the part of those engaged in the business, but the limited number of companies concerned, and the special training of their managers, in a measure offset the disadvantages of that independent action which had proved so hurtful to the fire companies.

The outbreak of the war of secession paralyzed the commerce of American ship-owners and was disastrous to the marine companies. The personal skill of the underwriters rendered the results less disastrous, however, than they would have been; the rates were raised to meet the increased risks. Nevertheless the losses were heavy, amounting in the case of a single company, which was rendered insolvent, to nearly $1,000,000. After the conflict was over the claims of the companies for these losses from Confederate cruisers were placed in the hands of the general government for submission to the international tribunal of arbitration at Geneva, and were there allowed; but Congress decided that the sum which was decreed as damages was paid as compensation to the government, and not in trust for individual claimants. The right of companies to reimbursement for losses on which they had received an extra premium was denied.

Since the war the ocean marine business in the United States has languished with the disappearance of the foreign carrying trade, and many of the companies have retired. What business has remained has been far from satisfactory, and during the last few years has been particularly unprofitable. In New England the fishery interests are largely protected in mutual companies organized for the purpose by vessel owners.

The rapid development of California, following the discovery of gold in 1849, was followed by the planting of Eastern and foreign marine agencies on the Pacific coast. The first local marine company was organized in 1861. The completion of railroads across the continent has resulted in an extensive foreign commerce on that coast, which is largely insured through foreign agencies planted in San Francisco.

The number of companies engaged exclusively in ocean marine business has always been comparatively small, because the requisite talent and experience required is uncommon, and the field, as compared with fire insurance, is limited, while the risks assumed are large. Shortly after the close of the war of secession several New York fire companies, that had already added inland underwriting, engaged in it; but the experiment in most cases proved unprofitable. In 1865 there were only eleven companies engaged in an ocean marine business in New York. In Boston, Providence, Philadelphia, and a few other cities a number of fire companies had for many years been writing marine risks, as well as the few companies that were restricted to this department. The general introduction of mutual companies after the great fires in New York, which worked so disastrously in fire insurance, has not been attended with the same consequence here. The mutual system has proved well adapted both to ocean-marine and life insurance. Premium notes, which were found to be so nearly worthless in the hands of fire offices, were good assets in this case on account of their more strictly mercantile character and the business responsibility of the makers.

No accurate statistics regarding the actual amount of marine and inland business done in the United States are attainable; the two are usually combined in the official returns rendered by the companies. Over one hundred companies were probably engaged in this business in 1885, some of which made no returns to State departments. New York, Boston, Providence, Philadelphia, New Orleans, and San Francisco have for many years been the chief centres of the marine business of the country; St. Louis has had a liberal share in underwriting on the Mississippi, while Chicago and Buffalo have been the centres for lake underwriting.

The following statistics from the official report of the insurance department of New York for 1886 will show the extent of the marine and inland business done throughout the country by companies reporting to that department, and which includes the larger part of the principal companies engaged in this branch of underwriting :

Class.	Companies.	Marine and inland risks written.	Premiums received.
New York Fire-Marine.....	8	$439,151,031	$2,220,231
Fire-Marine of other States	27	396,703,783	3,715,671
U. S. branches of Foreign. Fire............................	3	38,565,883	265,092
New York Marine...........	6	489,190,437	5,434,693
Marine of other States......	5	181,481,287	2,167,876
Foreign Marine...............	8	288,047,775	2,237,112
Total......................	57	$1,833,140,196	$16,040,675

Of these the fire-marine companies were all joint-stock, and their business outside of their fire risks was confined chiefly to inland marine. Of the purely marine companies 3 were from Massachusetts and 2 from Pennsylvania. Three were joint-stock companies and the remainder were mutuals, of which 2 had a capital stock. The aggregate assets of these purely marine companies amounted to over $22,000,000, and the capital stock of 5 of them to about $4,000,000. All were old-established offices; two had been about 12 years in business, the remainder over 20 years, while one dated back to 1803. Three belonging to other States were engaged in fire as well as marine business outside of New York. For many years no encouragement has existed for the organization of purely marine companies.

A comparison with the following statistics from the returns made to the New York department in 1865 will show the growth of the marine and inland business in the twenty years which followed :

Class.	Companies.	Marine and inland risks written.	Premiums received.
New York Fire-Marine.....	30	$365,558,981	$2,600,845
Fire-Marine of other States	15	155,357,964	1,531,521
New York Marine...........	11	933,664,826	11,025,158
Marine of other States......	2	31,750,008	381,272
Total......................	58	$1,486,331,779	$15,538,796

While the inland marine business of the fire-marine companies reporting to this department nearly doubled, the business of the purely marine companies correspondingly diminished in the twenty years following 1865. Within the last few years a modified form of individual underwriting has been revived in New York by the establishment of a Lloyds office, where risks are subscribed by an agent authorized to represent a large number of individual subscribers. (W. S. N.)

Miscellaneous Insurance.—Insurance other than life, fire, or marine was practically unknown in the United States prior to 1847, unless the operations of numerous benevolent societies be considered, which from an early date had been accustomed to render assistance to their members in case of sickness or financial trouble. But a few years before, Parliamentary investigations into the management of the English Friendly Societies (see Encyclopædia Britannica) had furnished the first authentic data upon the subject of sickness, and in reliance upon the data thus secured a number of companies were organized between 1845 and 1850, either wholly or in part for the prosecution of health insurance. Their operations were confined chiefly to the vicinity of Boston, New York, and Philadelphia. The experiment proved of brief duration. The statistics, however correct when applied to Friendly Societies in England, proved of no value in their new application. The companies were speedily deluged with fraudulent claims. The facility with which sickness could be counterfeited rendered thorough detection impossible, and the business was abandoned after a brief trial. The work was not confined to regularly incorporated companies, but was engaged in by numerous unchartered associations as well, which entered into a wild competition for members regardless of ages and with no intelligent understanding of rates. The experience of one incorporated company in Massachusetts showed that one-fourth of its members applied for sick-benefits during a single year, and claimed an average sickness each of a month's duration. Health insurance owed its sudden rise in popular favor to the public attention which was then for the first time being drawn to life insurance. But, unlike the latter, it had no effectual protection against fraud.

The introduction of health companies was followed in 1850 and 1851 by the incorporation of several companies in Pennsylvania and the West for the insurance of live-stock ; but their operations were small and proved unprofitable. A more determined effort was made to introduce this branch by the organization of the Hartford and the Ætna Live-Stock Companies, with a capital of $500,000 each, in Hartford, in the years 1866 and 1867. Sustained by such a capital, and under the management of men noted for business skill and prudence, it was confidently believed that the venture would prove successful. But the same difficulty was encountered as in the case of health insurance ; it was found impossible to exclude fraudulent claims ; rates high enough to cover the latter would drive away honest business. Both companies were wrecked within two years, one of them losing the greater part of its capital. Other companies for the same purpose have from time to time been organized in the West with little or no capital, and their experience has been attended with a like result. Several mutual associations were in operation in Maryland in 1884, but were unsuccessful ; and a few similar associations still exist in some of the smaller Western towns.

After the close of the war of secession, fidelity and burglary were suggested as profitable subjects of insurance. The latter never progressed further than the granting of two or three charters. Fidelity insurance was undertaken by a company organized for the purpose in New York in 1865, but the effort failed. In 1872, however, the Guarantee Company of North America, of Montreal, was started, and agencies were planted in several of the leading cities. The results soon proved that this form of insurance had a fair field before it. Repeated shocks to public confidence had increased the embarrassments naturally attending the furnishing of private sureties. Experience had proved, too, that such sureties were often pecuniarily unreliable ; and many moneyed corporations, as well as their employés, gladly availed themselves of the bonds offered by a corporation. Two companies have since been organized in New York for the same purpose, and in several of the States laws have been passed authorizing the acceptance of these corporate bonds by the courts. The cause of justice also has gained by the introduction of these corporations. The habits of the insured are watched, and defaulters are pursued without fear or favor by their sureties. Guarantees to the amount of over $30,000,000 were in force in the three companies doing business in New York State at the beginning of 1885.

In 1863 Mr. James G. Batterson, of Hartford, having an eye to the future, carefully studied the methods and principles of accident insurance in England, procured the charter for a company to be devoted to that branch in the United States, and the Travellers' Insurance Company of Hartford commenced business. It proved successful from the start, and within 18 months 27,000 accident policies were in force upon its books. Originally the business was limited to this branch. Along with general accident policies, which included a weekly compensation in case of injury, short-term tickets were issued for the benefit of railroad travellers, and sold at the principal ticket offices throughout the country. A life department was added two years later. The success of this company speedily led to the organization of numerous rivals in the various States. But the business was new and difficult to procure; remunerative returns could only be secured by a large volume of risks; the Travellers' had secured the field and within two years was left without a rival. Prior to their abandonment of the work, however, seven of its principal competitors had united with the Travellers' to organize the Railway Passengers' Insurance Company, also of Hartford, for the purpose of prosecuting the railroad branch of the business, which it was found could be best carried on in a separate office. Twelve years later the Railway Passengers' was reabsorbed by the parent office. The Travellers' remained without other rivals until the organization of a company in Montreal in 1874, and another in New York in 1876. The great bulk of the business still continues in the hands of the original office. At the beginning of 1885 nearly 100,000 accident policies were in force in these three companies, insuring $250,749,764. Two or three accident companies have also been organized in the West. The New York company, however, combines, with its accident business, fidelity, plate-glass, and steam-boiler risk; and this combination of various classes of risks by casualty companies has created some discussion in insurance circles as to whether each branch of insurance should be prosecuted independently, or whether the better plan is to combine several departments in the same office. State legislation interposed many years ago to compel such a separation in the case of fire and life risks, on the ground of the total dissimilarity of the business; but the same doctrine has not been extended to risks more nearly alike in their general character, and especially where each department can cover but a limited field.

Following accident insurance another branch of casualty underwriting was successfully inaugurated in Hartford, in 1866, by the organization of the Hartford Steam-boiler Inspection and Insurance Company, for the purpose of protecting the users of steam-boilers against loss from explosions. This company, too, until about 1876 enjoyed a practical monopoly of the field, and still does the larger share of the business. The risks in force in this and in two New York companies reporting to the department of that State amounted at the beginning of 1885 to $36,288,643. In one important respect this branch differs from others; the insurance is in reality a subordinate feature of the contract. The company undertakes by a rigid system of inspection to prevent explosions altogether: the insurance is rather a guarantee of its efficiency in this direction. This systematic guardianship of the management and soundness of steam-boilers has proved of great practical benefit to steam-users generally, and the conditions under which boilers are liable to explode are now fairly well understood. The insured losses are comparatively few, and the chief element of expense is the inspection required.

Since 1870 successful efforts have been made to introduce the insurance of plate-glass, for which there was a growing demand on account of the increased use of that article in the leading cities. Three companies were prosecuting this business in New York in 1885, whose returns showed risks in force at the beginning of that year amounting to $9,531,578.

Accident, fidelity, steam-boiler, and plate-glass are the principal branches other than fire, marine, and life insurance, which may be said to have secured an established foot-hold in the United States; but one or two others are in an experimental stage with fair prospects of success. The frequent destruction of growing crops by hail has for many years rendered hail insurance popular on the continent of Europe; the same idea has been imported by immigrants from abroad, and some attempts have been made in the farming districts of the West to insure growing crops through mutual associations. In Pennsylvania and a few of the Western States the business has been prosecuted by small mutual organizations for some years. The ordinary fire policy covers damages from lightning only when fire results, and a limiting clause in the contract frequently renders it doubtful how far this liability extends. The damages from lightning among farm property in the West have been so great that many of the fire companies by special clauses have extended their contracts to cover this risk.

The extension of the signal service and the increase of population in the United States beyond the Mississippi have attracted wide attention since 1880 to the tornadoes to which many sections in the Mississippi Valley and the South are specially liable. The overwhelming ruin wrought in the path of these storms has created a strong demand for insurance protection. Several fire companies located in Western States and a few agency companies in the East have consequently engaged in writing tornado risks, being aided by special investigations carried on under the auspices of the United States Signal Service at Washington. Two great difficulties have been encountered to secure any trustworthy estimate of the costs of such risks and to obtain a basis of average wide enough to protect the company. The ordinary rules of fire insurance will not apply. The destruction from a single tornado will often extend through many miles of territory, and to so scatter the risks that a fair average of losses only may be obtained requires special skill.

Title insurance is the most recent applicant for popular favor in the United States. The success met with by the Real Estate Title Insurance Company in Philadelphia, the first of its kind, led to the passage of a general act in Massachusetts in 1884 authorizing such corporations, under which a similar company was started in Boston, and another was organized in New York shortly after. The object of the business, as the name implies, is to examine and furnish information regarding real estate titles and to guarantee the owners against loss through defective titles. The accumulation of records and multiplication of transfers have each year rendered the work of searching titles more cumbrous in the larger cities, while they have enhanced the dangers of undiscovered defects. The purchaser was compelled to trust to the thoroughness of the work done by the searcher employed independently in each case. These companies aim to so systematize the knowledge concerning titles that they can with less labor furnish abstracts of title backed by a substantial guarantee. As in the case of steam-boiler inspection, the insurance feature of the work is wholly subsidiary. The only risk assumed is the defective character of the company's own work, and the insurance against this is essentially like the guarantee which attaches to many other classes of business contracts.

The prevention of losses rather than furnishing a mere indemnity, thus importing the element of an ordinary guarantee into the insurance contract where practicable, is an idea which has been growing in favor in the United States in recent years. In nearly every department of insurance the reduction of the risk when possible has become a prominent feature. The social conditions favorable to the prosecution of other branches of insurance than fire, life, and marine in the United States did not exist until the rapid accumulation of wealth and population, and the growth of mechanical industries subsequent to 1865, brought the country more in line with the older settled states of Europe. As wealth and population increase it is not unlikely that new branches of insurance will continue to arise to meet the demands. While the mutual system has to some extent been employed, the majority of the business in these minor insurance fields has been prosecuted through stock companies; the temporary character of the risks and the necessity of first creating a demand for such insurance generally requiring a stock organization. (W. S. N.)

INTERNATIONAL LAW, PRIVATE. The ENCYCLOPÆDIA BRITANNICA, under the title INTERNATIONAL LAW, treats only of the Public International Law. This article on the other hand will treat only of Private International Law, or, as it is sometimes called, "Conflict of Laws." This branch of jurisprudence treats of cases of private right affected by the laws of two or more sovereigns. That such cases are very numerous a glance at our current litigation will show. There are few suits of importance which do not involve questions that at some period arose under the laws of a foreign state. Our business with England, with Germany, with France, leads to many important negotiations; and the interstate relations of the several States of our Union are so intimate that there is scarcely a business transaction of any large extent that does not involve a reference to the laws of two or more States in those matters in which these States are to each other as foreign powers. Nor is this confined to contracts. Whether a marriage valid in A is valid in B; whether a child legitimate in A is legitimate in B; whether a will good in A is good in B; whether the property of a person dying in A passes by the laws of A, or by the laws of B, where the property is situate—these are questions to be determined by private international law.

A. PRIVATE INTERNATIONAL LAW PART OF THE COMMON LAW.—It was for a long time contended that when we gave effect to the laws of a foreign state (*e. g.*, in recognizing the validity of a foreign marriage) we acted from courtesy, and not from duty; and hence it was argued that we should not show this courtesy to foreign states by whom it was not shown to us. This view, however, is now abandoned. A court of justice sits to administer not courtesy but right. When the question, for instance, of the validity of a foreign marriage comes up, the decision must be in conformity with the rules not of courtesy but of law. The law, in this and in all kindred questions, is now settled. It is that a case is to be determined by the laws of the State to which it is distinctively subject, provided there is nothing in such laws contravening the domestic policy of the adjudicating State. A foreign marriage, for instance, good according to the laws of the place where it was solemnized, we regard as good, provided there is nothing in it contravening our domestic policy; and hence, while we would hold a Mormon marriage invalid, as falling within the latter exception, we would regard foreign monogamous marriages by competent parties valid, though not solemnized according to the forms which our own legislation may make imperative for marriages which take place within our own borders. And the principle that each case is to be governed by the law to which it is distinctively subject is now to be regarded as part of our common law. We hold that the applicatory foreign law is in such cases authoritative, not because we desire to show a courtesy to the State whose law is thus recognized, but because we incorporate, for the purpose, that law into our own system. And in no other way and by no other principle can justice be done.

It has been stated that the rule that we will apply to each case the law by which it is distinctively governed is subject to the exception that we will not permit a foreign law in this way to override our own jurisprudence in matters of peculiar domestic policy. As matters of domestic policy which we do not permit to be thus overridden may be mentioned our laws as to monogamy, as to minority, as to lotteries and other transactions deemed by us immoral, and as to freedom of trade. Another exception is to be found in non-extraterritoriality of penal laws. No State will execute the penal laws of another State, either directly or indirectly. No State, in other words, will undertake to enforce by a criminal prosecution the penal laws of another State, nor will it permit its courts to sustain actions for penalties imposed by a foreign law. Nor, as a rule, will one State enforce another State's revenue laws.

I. *Domicil.*—The first question that arrests us, in studying private international law, is that of domicil. By the domicil of a child is its legitimacy determined. By the domicil of the husband, according to the preponderating opinion, is the law of marital status to be determined; and domicil gives jurisdiction for divorce. Domicil decides how the personal property of the living is to be taxed; and domicil decides how the personal property of the dead is to be distributed. The important question, *What constitutes domicil?* is one to which various answers have been given. As to certain general features all parties agree. A mere transient residence is not a domicil; nor is a place selected for exceptional business purposes. There must be what is called the *animus manendi;* but this is not all. There must not only be an intention to remain but there must be an intention to remain in the particular place as a fixed abode. Of course this test is only necessary in cases where a residence is changed. A person who remains in the place of his nativity is presumed to do so in the view of permanence; and no specific intention of remaining permanently is required in those cases in which it could not be established, as in the case of infants. But when a domicil of birth is abandoned by a party capable of choosing, then, to establish a new domicil, the intention to remain fixedly must be shown. And it should be remembered that as the law of domicil has its principal application in protecting the home relations, a permanent domicil may be regarded, using the term in its general sense, as a permanent home, and a permanent home as a legal domicil. It is the law of the home as distinguished from the law of the place of business, that determines legitimacy, marital rights, taxation, and the mode of succession. And it is proper that this should be the case, since it is the home relation that it is the first office of jurisprudence to maintain intact. The place which a man selects as his home is the place which supplies the law by which the legitimacy of his children is to be determined, by which his personal status is to be settled, by which his taxes to his government are fixed, and by which the distribution of his estate is made.

II. *Marriage* is an institution of international law, and is accepted as such by all Christian states. It has been frequently spoken of as a contract; and it is undoubtedly so far a contract that to it assent of competent parties is essential. But it is to be distinguished from a mere contract in the following important features:

1. Contracts can be moulded and modified at the will of the parties. But marriage cannot be so moulded and modified. It must be an exclusive conjugal union for life. If a man and a woman should say "we will be married for a term of years," or "our marriage is not to be monogamous," this would not be a marriage.

2. For injuries received in the discharge of contractual duties one party may recover damages from another. The majority of the cases tried in our civil courts are of this character. A sues B for a breach of contract. But when A and B are married, no suit for damages can be brought by one against the other.

3. Contracts can be dissolved at the will of the parties: not so marriage. In most countries, it is true, divorces may be obtained by a wronged party, but these divorces are adverse proceedings, valid only when duly decreed by the proper court; and not only would a divorce by mere consent be a nullity but if there be proof of collusion no divorce will be decreed.

4. Contracts are subordinated to the state, but the state is subordinated to marriage. The state may pass statutes of limitation, providing that contracts shall cease to bind after a designated period; and it may pass bankruptcy statutes, discharging the bankrupt's indebtedness. Statutes of both classes will be extraterritorially enforced in all cases in which the contracts they affect are subject to the state by which the statute was enacted. It is otherwise as to marriage.

Statutes limiting the term of marriage, or providing that all marriages should be dissolved at a particular date, would have no extraterritorial effect. A foreign statute authorizing polygamous marriages will be no defence, in one of our States, to the subjects of the state enacting the statute, should they be indicted for here living in adultery; nor will the children of such marriages be regarded extraterritorially as legitimate. The state is above contracts, but marriage is above the state.

5. Deception avoids a contract it induces; and a contract which a party is fraudulently inveigled into may be rescinded on his application. It is otherwise with marriage. No fraud or deceit, no matter how flagrant, will be ground for rescinding a marriage between competent parties, with the single exception, only partially recognized, of a pregnant woman marrying a man without notice of her pregnancy, he believing her to be chaste. There is no other case of fraudulent representation which will sustain an application to annul a marriage. No matter how great may have been the imposition in other respects, the marriage binds, if there is no mistake as to identity, and if the parties were competent to marry.

Marriage, therefore, though founded on consent, is distinguishable from contract in several important features: (1) it cannot be modified by consent; (2) no suit for damages can be maintained by one party against the other; (3) it cannot be dissolved by consent; (4) it cannot be internationally affected by local limitations or discharges; (5) it cannot be rescinded on proof of fraud. Yet these are the chief peculiarities of contracts. We have, therefore, to hold that marriage, being destitute of the chief peculiarities of contracts, is not to be regarded as a mere contract. It is more properly, as has been ruled by a French court of high authority (*Trib. civ. Seine*, 1878, cited *Jour. du droit int. privé*, 1879, p. 66), "une institution du droit naturel et du droit des gens." And in this conclusion all our leading jurists coincide.

As an international institution, a marriage, to be extraterritorially effective, must possess the following incidents: 1. It must be by a man and a woman capable of sexual union, neither of whom is bound by a prior marriage. 2. It must be for life. 3. It must be exclusive. 4. It must not be incestuous. It is as to the last point only that difficulties arise. All Christian nations agree that marriages between brother and sister, and between ascendant and descendant, are invalid. Whether other limitations should be applied is a matter of local policy. In Roman Catholic countries, where several families of one stock live together under the same roof, and where the church exercises a dispensing power, the rule that relations in the second degree should not marry, and that marriage with a relative by marriage is as objectionable as with a blood relation of the same degree, may work well. It is otherwise in Protestant countries, where there is no authority by which dispensations can be granted, and where the usage is for families to live so far separate that many of the evils incident to the right of relatives in the second degree to marry are removed. Restrictions, also, based on age and on religious disparity or ecclesiastical incapacity, are matters of local policy which have no extraterritorial effect. Hence the subjects of a foreign state, who by the laws of their domicil are not capable of marrying, either from minority, or from religious disparity, or from ecclesiastical incapacity, may contract within our borders marriages which we would hold valid.

The prevalent view is that the mode of solemnization is to be determined by the law of the place of solemnization. In this country the almost universal rule is that no specific form is necessary to the validity of marriage, but that if consent by parties competent to marry be proved, and the man and the woman accept each other as husband and wife, there is a valid marriage, though there is present at the ceremony neither ecclesiastical nor civil officer, and there is no specific form used. In Massachusetts and Rhode Island—and it may be in one or two other States—it is essential to the validity of a marriage that it should be solemnized, after license taken out at the clerk's office, before either a magistrate or a domiciled minister of a religious denomination; and in Massachusetts, in 1879, a marriage, not in the presence of an officiating clergyman or magistrate (the parties not claiming to be Friends or Quakers, in whose behalf the statute makes an exception), was held to be invalid, though a license had been taken out of the clerk's office (Com. *vs.* Munson, 127 Mass., 459). By the Roman Catholic Church, it is true, marriages are invalid unless solemnized before the parish priest; but able Roman Catholic canonists, among whom may be mentioned the late Cardinal Wiseman, have declared that the decree does not bind persons not Roman Catholics, and by its own limitation the decree is not operative in countries where it has not been published; and it never was published in France, or in any part of the territory now belonging to the United States. Hence, even according to Roman Catholic standards, a simply consensual marriage (*i. e.*, a marriage based simply on consent, without the presence or sanction of any ecclesiastical or civil officer) is valid everywhere when the marriage took place in a State where such a marriage is locally valid.

It is also agreed on all sides that, by the canon law before the Council of Trent, consensual marriages were valid, although there was no ecclesiastical sanction, and that this canon law is the law brought with them to North America by European colonists, and is part of the common law of the several States in the American Union. Unless modified by local statute, as in Massachusetts and Rhode Island, this common law continues in force throughout the United States.

III. *Divorce.*—In respect to divorce the diversities of legislation are so great and various as to provoke innumerable conflicts. The Roman Catholic Church, which has largely influenced legislation in countries where it is the established religion, refuses to acknowledge any divorces as valid; but it claims the prerogative of annulling marriages in cases of consanguinity, affinity, and pre-contract. In France no divorces were permitted (with the exception of a short period during the Revolution) until 1882. In Italy, Spain, and Portugal, divorce *a vinculo matrimonii* is not permitted, though in these countries, as well as in France, there may be divorces *a mensa et toro*, which, while releasing the parties from the duties and burdens of matrimony, do not permit subsequent marriages with other parties. Divorce *a vinculo matrimonii* is permitted in England, in Germany, in Switzerland, in Russia, in Denmark, in Norway, in Belgium, in Holland, and in Russian Poland. In Austria divorces of this class are permitted only when the parties are not Roman Catholics; if Roman Catholics they cannot be divorced for any cause. In England, Belgium, and Holland there may be divorces *a mensa et toro* as well as divorces *a vinculo matrimonii.* In the several States composing the American Union divorces *a mensa et toro* are not, as a rule, known; though there are several States in which married women are permitted to obtain decrees of court permitting them to act independently as *feme sole* traders. There is no State (with the exception of South Carolina) in which divorces *a vinculo matrimonii* are not permitted. The jurisdiction, however, is one as to which each State is supreme; and each State has its own distinctive legislation. In some States mere "residents" are permitted to apply; in other States there must be "residence for six months;" in other States "residence for one year;" in other States domicil. In all States desertion and cruelty, as well as adultery, are grounds for divorce; in all States divorces are granted *ex parte*, on due cause shown by the petitioner; in all States the wife can acquire a "domicil" (or "residence," when this is the statutory condition) for divorce purposes apart from her husband. The conflict arises when one

State undertakes to divorce a party who is the domiciled subject of another State. On this topic Pennsylvania has taken a peculiar position, the Supreme Court of that State holding that the procedure, in order to be valid, must be brought in the State where the deserted party, in cases of desertion, is domiciled. In most of the States it is now held that no divorce is extraterritorially valid unless granted by a State in which the petitioner was domiciled in accordance with the rules of international law. Mere residence will not be sufficient internationally to confer jurisdiction for this purpose, though such residence is made sufficient by local statute. Whether, when the petitioner is domiciled in the divorcing State, it is sufficient for the defendant to be notified by publication, has been the subject of much discussion. When both parties are domiciled in the divorcing State, then, if the local statutes make such notice sufficient, it will be regarded as sufficient in other States. But when only the petitioner is domiciled in the divorcing State, then the better opinion is, that to make the divorce extraterritorially effective, it is necessary, in all cases in which the defendant's residence was known to the petitioner, that there should be personal notice given to the defendant.

IV. *Personal Capacity.*—The laws regulating personal capacity, so far as they are artificial, are not extraterritorially enforced unless sustained by the policy of the adjudicating State. This is eminently the case with regard to laws fixing minority. In States overcrowded with population, it is natural that the period of minority should be extended, so as to diminish the pressure of business competition. In newly settled States the co-operation of young men is an important element of business prosperity. In some States the feeling, even among political economists, is, as Lord Beaconsfield expresses it, that the blunders of youth are more beneficial to society than the triumphs of maturity or the successes of old age. In other States no measure that men of experience would not sanction commends itself to the sober and final judgment of the community. In some European states restrictions in respect to age are so far carried as to exclude from business all young men under twenty-eight, and to invalidate all marriages in which there are living parents who do not give their consent. In the United States there is no State in which the consent of parents is necessary to the validity of marriages, and although the common law rule fixing majority at twenty-one is everywhere established, yet there is no State in which the common law rule of the father's right to the child's earnings is enforced, while in some States the right of boys over eighteen to make contracts of service is recognized. These are all rules of domestic policy, hence we do not consider ourselves bound by foreign laws limiting the business capacity of subjects when such subjects visit our shores, unless such laws are in harmony with our own. Hence a foreigner of twenty-five, who, by the law of his domicil is not *capax negotii*, would be regarded by us as bound by contracts he should make when doing business in one of our States.

The same distinction is made as to married women. A married woman, by the laws of her domicil, cannot make a binding contract. She visits a State where by law married women may do business. In such matters the *judex fori* will be bound by his own distinctive law. If by that law no married woman can do business, then a contract by a married woman will not be enforced, supposing the law applies to process as well as to right. If, on the other hand, by the local law married women can do business and can be sued, then a married woman cannot defend on the ground that by the law of her domicil she was incapable of contracting.

V. *Legitimacy.*—As a rule the law of the father's domicil determines the question of the child's legitimacy, supposing the child to be born in the father's domicil. This question has been much agitated in England in cases where children born illegitimate claim to be legitimated by their parents' subsequent marriage. For some time it was considered that such children could not inherit as children under the English distributive statutes. A majority of the court of appeal, however, decided in 1882 that such children, if legitimate by the law of their domicil, and that of the domicil of their father, would be regarded as legitimate in England for all purposes except the inheritance of real estate, from which they had been previously excluded by special statute (Goodman *in re*, 44 L. T. N. S., 527). Such will probably be held to be the law in this country in all cases in which the father and the child are domiciled in a State by which the child is by the local law legitimate. Two questions are here to be considered. First, were the parties—father and child—domiciled in, and, therefore, in this respect subject to the jurisdiction of, the legitimating State. If so, the stamp of legitimacy impressed on the child will be recognized in a foreign State, unless, in the second place, the legitimation be of a character which by such foreign State is regarded as immoral. We would not acknowledge, for instance, a legitimation based on a polygamous union, although such legitimation was lawful in the State by which it was decreed. Polygamy is immoral by private international law, and children of polygamous marriages cannot be regarded extraterritorially as legitimate. But we cannot say that legitimation by subsequent marriage is immoral by private international law. In the Roman Catholic Church, and by the old canon law, such legitimation is regarded as a moral act, and in many cases a matter of duty. A man who has children by a particular woman, for instance, acts, so it is held, meritoriously in marrying her; and under such circumstances it seems hard to distinguish between the offspring—to make those born before the marriage illegitimate while those born after the marriage are legitimate. In several of the States of our Union, also, marriages have this retrospective effect; and in view of these facts, and of the recent decision of the English court of appeals, it is not likely that the legitimacy of children thus legitimated by a State having jurisdiction will be denied even in States by which no such legitimating power is assigned to subsequent marriages.

VI. *Adoption.*—A similar distinction exists as to adoption. A State may refuse to enact adoptive statutes, and may incorporate in its jurisprudence the principle that parties not born in wedlock shall not be entitled to inherit as children. Supposing this to be a rule of public policy, then such State would not permit children adopted abroad to inherit as heirs property within its bounds. If, however, it sanctions adoption in its own legislation, then it will give effect to an adoption duly authorized by a foreign State having jurisdiction. This was the ground of an interesting ruling in Massachusetts (Ross *vs.* Ross, 129 Mass., 243), in which it was held that a Pennsylvania adoption, both the adopting parent and the adopted child being domiciled in Pennsylvania, would sustain a suit in Massachusetts brought by the adopted son to recover as the adopting father's heir real estate in Massachusetts of which the adopting father died seized.

VII. *Title to Things.*—So far as concerns real estate there is no conflict. The *lex situs*, by the consent of jurists of all schools and of courts of all countries, determines as to the title of real estate, as to its mode of transfer, and as to the incumbrances to which it is subjected. As to personal property, however, many complicated questions arise. In the Middle Ages, when most personal property could be carried about the person, the maxim arose, *mobilia personam sequuntur.* This maxim became a settled principle of law, and it was for centuries held that all personal property is governed by the law of the owner's domicil. But the assumption that personal property adheres to the person, however correct in the Middle Ages, cannot be maintained in times like the present when five-sixths of the wealth of the community consists in personal property. We take, for instance, the estate of a deceased capitalist, and we find that the great body of it consists of personal property, which it is as much the interest of the body politic to keep under territorial control as it is that real property should be so kept. There is just as much reason, in other words, why stock in banking, mining, telegraph, and transportation corporations should be governed by the law of the State where these corporations are situate, as there is why real estate should be governed by the law of the place where it is situate. And there are other reasons why the *lex situs* should in such matters be the final arbiter. 1. No other sovereign than the sovereign of the *situs* can take tactual possession. 2. A party who places property in a particular jurisdiction voluntarily subjects it to the laws of such jurisdiction. 3. And if the *judex situs* is not the arbiter, no other arbiter can be found in all cases in which the contending parties have different domiciles with different applicatory laws. For these and other reasons the courts now are gradually throwing aside the old rule that the *lex domicilii* governs personal property, and accepting that of the supremacy of the *lex situs*. There is, however, an important exception. Debts, so far as concerns taxability and assignability, are governed by the law of the owner's domicil.

VIII. *Contracts.*—As to contracts the questions are very complex. The following distinctions, however, may be considered as settled: 1. The mode of solemnization is determined by the *lex loci actus*, or the law of the place where the solemnization takes place. 2. Interpretation is determined by the law of the place, in subordination to which the contested terms are used. 3. Mode of performance is determined by the law of the place of performance, and so is the legality of the performance. 4. Form of suit is determined by the *lex fori*. Questions of this class arise most frequently in respect to contracts which are assailed on the ground of usury, or of the illegality of the thing to be done, as is the case with contracts for the sale of spirituous liquors or other prohibited articles. Laws of this class present innumerable shades. There are no two States which adopt precisely the same statutes on these vexed topics; and as such contracts, whose field of operations embraces two or more States, are innumerable, questions involving the applicability of such laws are constantly arising. The solution is simple. A court will not lend its aid to enforce a contract which by the law of the *lex fori* is immoral. But if the contract is not in this sense immoral, and if the State where it is to be enforced does not make it illegal, then the mere fact that its performance in the State where the suit is brought would be illegal does not prevent such suit from being successful. A suit, for instance, in Rhode Island, for the price of spirituous liquor to be delivered in New York, will be sustained in Rhode Island if the transaction is not illegal in New York, though it would have been illegal in Rhode Island if the delivery was to have been in that State.

IX. *Succession.*—With regard to the distribution of the estates of deceased persons, there is a substantial unanimity of opinion among civilized states. By the death-bed, as well as by the cradle and the marriage assemblage, the *genius domicilii* stands supreme. Just as the law of domicil determines the legitimacy of the child, and the law of domicil determines the conditions of marriage, so the law of domicil, and not the *lex situs*, determines how personal property descends on its owner's death. The reason why this subordination of local to domiciliary law should be acquiesced in by countries whose jurisprudence in other respects presents so many conflicting features, is the growing sense that the family is the foundation of the state, and that allegiance to the state is based on allegiance to home. Even for the mere purpose of preserving loyalty to the state, it is essential that loyalty to home should be maintained as the supreme duty of life; and hence, for the same reason that we hold children legitimate when legitimate by the law of their domicil, though they would not have been legitimate had they been born in our own State, and that we hold the conditions of marriage, as determined by the law of the matrimonial domicil, we regulate the distribution of the property of a deceased man by the law of his last domicil. Real estate, perhaps under the influence of feudal traditions, perhaps from the fact that the ownership of the soil is closely related to its political management, is, it is true, governed by the *lex situs*. But no matter where a man dies, his personal property, scattered though it may be over the whole civilized world, descends according to the *lex domicilii*. And in this conclusion the jurisprudences of all the States of our American Union unite with the jurisprudence of England, of Scotland, and of the continent of Europe.

B. Criminal Law. On the subject of criminal jurisdiction the following theories are propounded:

1. That the state in which a supposed offender is arrested has jurisdiction over the offence. This, which is sometimes called the cosmopolitan theory, is based on the assumption that each sovereign is entitled to punish every person who enters his territory for past misdeeds no matter where committed; the sovereign being regarded as the general vindicator of morals and the punisher of wrong. With the qualification that the party arrested, to make him responsible for offences committed abroad, must be a subject of the prosecuting sovereign, this view is adopted in the French code and by some leading German jurists. The objection to it is that it not only casts an unnecessarily heavy burden on the home courts, but that it often transfers cases from sites where the witnesses to the transaction can be readily obtained to sites where they are practically unobtainable.

2. That a state has only jurisdiction to punish offenders when both the offender and the person or thing injured were, at the time of the offence, on the territory of the prosecuting sovereign. The objection to this view is that it deprives a state of jurisdiction in many cases essential to the preservation of its sovereignty, and in many cases, also, in which, if this limitation be asserted, grave offences would go unpunished. United States securities, for instance, are forged in a foreign land; or a false oath is taken in a foreign land before a United States commissioner. Would it be gravely maintained that if the offender in such cases should be arrested on our shores he should be acquitted for want of jurisdiction? If so, a large class of crimes, very prejudicial to our national interests, would go unpunished; since the states on the continent of Europe, to which such offenders would resort, are states which decline jurisdiction over offences directed against the sovereignty of foreign states. Similar remarks might be made as to offences committed in barbarous and semi-civilized countries. We have constantly asserted jurisdiction of this kind as to offences committed either by or on our own subjects. But neither of these classes of jurisdiction could be asserted by us if we could only punish for offences in which both the offender and the person or thing offended were at the time of the offence within our boundaries.

3. That penal jurisdiction belongs to the country of arrest as to all offences committed against the laws of such country, with the limitation, that as to offences committed in foreign civilized lands, such country of arrest has jurisdiction only of offences distinctively against its sovereignty. This is the only theory on which our legislation and judicial rulings can be sustained. Numerous statutes have been passed by Congress making it an offence to forge, in a foreign country, United States securities, and to take false oaths before United States consuls; and statutes, also, have been passed establishing consular courts for the trial of offences in barbarous and semi-civilized lands. No court has ever doubted the constitutionality of these

statutes, and under them many convictions have been had. We have also had numerous rulings that at common law the State where an offence takes effect has jurisdiction to punish the offender. A conspiracy is organized in Canada, for instance, to cheat parties in New York by letter, and the conspiracy is carried into effect in New York; and in this case New York has jurisdiction over the offence, and can try the offenders, if found, within her boundaries. An explosive machine is sent by express from New York to San Francisco; in case of damage done in San Francisco, California has jurisdiction. A shot is fired on the Mexican side of the boundary between Texas and Mexico; if a man is killed by this shot the offender can be prosecuted in Texas. The place of consummation, as a place, has jurisdiction.

This brings us to what is the radical question which underlies the whole topic of jurisdiction. Is the jurisdiction over crime *subjective* or *objective?* In other words, does jurisdiction depend upon the locality where the offender (the "subject" or "actor") was at the time of the crime, or on the locality of the thing or person injured? It may be urged that under the Constitution of the United States crimes must be punished in the district in which they were committed; and that this sustains the subjective view, which makes the locality of the offender at the time of the commission of the crime the test. But to this the answer is, (1) that it is the *crime* and not the *offender* whose locality is the standard; and (2) a cotemporaneous exposition was given to this clause by statutes passed by the first Congress, giving the federal courts jurisdiction over piracies and other offences on the high seas. And although, no doubt, the prevalent opinion has been in favor of the subjective theory, yet, when we turn to the language of the standards, and inquire, also, as to the reason of the thing, we will find that this theory is without the authority it is supposed to possess. When we say "the place where a crime was committed" the first impression, no doubt, is that we mean "the place where the offender was at the time of the offence." Yet this definition introduces a new element—that of the locality of the offender, which may or may not have been the locality of the crime. And, as a matter of reason, a sovereign should be entitled to punish attacks on himself or on his subjects, whenever these attacks take effect on his soil, no matter where the offender was at the time. Were this not so there is not a home that would be safe from missiles sent by express from abroad; not a business man but what would be exposed without redress to the machinations of foreign swindlers; not a public or corporation loan that might not be forged with impunity abroad; not a bale of goods that could be imported without being covered with false affidavits, whose concocters could defy all attempts to bring them to justice. The position of the offender, also, we must remember, is fortuitous, and may be so artfully selected as to make it the spot which would put most difficulties in the way of arrest. It is the place where the crime takes effect that gives its permanent distinctive type to the crime.

An important question in this connection was agitated in the Franconia case, in which it was held by a majority of seven to six of the English judges that the English courts had no jurisdiction of the manslaughter through negligence of a British subject by a collision on the British Channel about 2½ miles from Dover. (See discussion in Wharton's *Conflict of Laws*, § 818.) A statute was subsequently passed by the British parliament asserting jurisdiction in the English courts over a three-mile belt of the sea around the entire English coast. This assumption, however, is not acquiesced in generally by European continental authorities as giving a correct rendering of international law; and might involve serious disputes if pressed in respect not only to the British Channel but to the North American estuaries separating the British dominions from the United States. Nor is this the only objection to the rule as thus defined. As a claim of jurisdiction in all cases it is too broad; as a claim of jurisdiction in cases where subjects of the prosecuting sovereign are injured it is too narrow. The three-mile zone, it is well known, was adopted at a time when the range of cannon was not supposed to exceed three miles. "We might be bombarded by a private marauder," so it was argued, "three miles off; and we should take jurisdiction over three miles." But cannon range is now extended to nine miles; and if the reason sustains any jurisdiction it sustains jurisdiction for nine miles. The best solution is the objective theory above stated. We ought not to take cognizance of an offence committed in a foreign ship on the high seas within three miles of our coast-line unless the peace of a port or of the shore be in some way thereby disturbed. On the other hand, if within nine miles of the coast a shot be fired by which property or persons on shore are injured, we should have jurisdiction of the offence, and we should have jurisdiction of all injuries done to our subjects on the high seas no matter how far from land. It will be found, in fact, that by adopting the objective theory the difficulties that meet us as to criminal jurisdiction may be solved. A libel, for instance, is mailed in one State to be delivered by a letter-carrier in another; or a scheme for lotteries is concocted in a State where lotteries are allowed, to operate in a State where they are prohibited by statute; or intoxicating liquors are forwarded to a State where their retailing is illicit; or poison or explosive compounds are sent by express to a distant State; or letters containing false pretences are sent from abroad to impose upon and defraud merchants in the State to which the letters are addressed. Now irrespective of the question whether these offences are indictable in the State of their concoction, they are to be regarded as indictable in the State where they take effect. Against the peace and order of that State they militate. The laws of that State they were intended to assail. Nor can it be said that the offender by this process is dragged before a foreign tribunal. It is a tribunal which he himself selects, when he undertakes to operate within its jurisdiction; it is there, also, that are to be found the witnesses to the act which he chooses to commit.

It may happen that a particular offence is an offence against the jurisdiction, as is the case with offences against the federal government which are at the same time indictable in the particular State in which they are committed; and with offences which, begun in one country and consummated in another, are cognizable in both countries. In such cases, where the jurisdiction of the entire offence is assumed by both countries, then the better rule is that the country first instituting *bona fide* proceedings absorbs the jurisdiction. When, however, a particular section of an offence is cognizable in one country, and another section is cognizable in another country (as where mailing a libel is indictable in the place of mailing while its publication is indictable in the place of delivery), then, if the offender is convicted and sentenced in one of these countries, and should subsequently be tried and convicted in the other, allowance should be made in adjusting the sentence in the latter country for the punishment endured by him in the former country.

Extradition.—With the subject of criminal jurisdiction that of extradition is closely connected. If there were no extradition not only would the right to punish for offences operating in one territory but concocted abroad be seriously impaired, but, with the present facilities for travel, adroit offenders would in many cases defy the laws by escaping to foreign lands where they would be secure. So strong has been the feeling that some check should be placed on evasions of this class that it has been sometimes held the duty of sovereigns, even without treaty, to surrender to other sovereigns fugitives from justice charged with crimes against the laws of the demanding sovereign; and in addition to this general duty, extradition is now made obligatory by treaties existing between all civilized states with scarcely an exception. The particulars of these treaties, and of the process of extradition under them, cannot be here discussed in detail. The following general features, however, may be noticed:

(1.) When there is an extradition treaty between two countries this must strictly be followed, and no extradition permitted except for an offence specified in the treaty. This is not merely on the principle *expressio unius est exclusio alterius*, but because the proceeding is highly penal, and a surrender should only be permitted in the case which the treaty prescribes.

(2.) Whether a sovereign will surrender for an offence consummated in the territories of the demanding state when the offender was not at the time of the offence in the latter state depends in part on the terms of the treaty, in part on the question whether the offence is one of which the sovereign on whom the demand is made has jurisdiction. In some treaties only "fugitives" can be demanded; and in such cases a demand cannot be made for the surrender of a person not technically a fugitive. Supposing this obstacle not to be in the way, it is easy to conceive of cases in which the sovereign on whom the demand is made should say, "I have, according to my distinctive jurisprudence, jurisdiction over this offence; I can try it as fully and as faithfully as it could be tried if the warrant of extradition is executed; the alleged fugitive is my subject, who has never left my shores; I will not let him go." This, in cases where the offence is on the merits cognizable in the state on which the demand is made, is ground for refusing a requisition; and the case for refusal is strengthened when there is reason to believe that the trial in the demanding state would not be fair. But ordinarily, supposing the treaty does not exclude such cases, there should be a surrender whenever (supposing the papers are in other respects regular) the offence, though concocted elsewhere, was consummated in the demanding state.

(3.) The most embarrassing questions of extradition are those which relate to crimes in which political motives enter. It is agreed on all sides that extradition will not be granted for a purely political offence; and when this limitation is not incorporated in treaty it is recognized as a part of public international law. The reason is obvious. There is no sovereign who may not in his turn be a fugitive; there are few states in which parties now dominant have not been compelled to accept in former periods as exiles the hospitalities of foreign states; to require the surrender of political refugees would greatly intensify the bitterness of revolutions, and impose on states of refuge the invidious and sometimes intolerable duty of delivering up to a merciless and cruel persecution men whom it may regard as exercising political rights, if not as the martyrs of rightful political principle. The mode of trial and nature of punishment, also, in political prosecutions have not, as is argued by Bluntschli, that impartiality and moderation which will justify an umpire state in exercising this high and delicate prerogative of sovereignty. Then, again, though the object of treason is the same in all civilized states, yet as to what constitutes treason there is the widest divergence. In one country dissent from the established church, in another the maintenance of freedom of speech, in another an appeal for a reformed constitution, may be regarded as treason. But whatever may be the reasons, the practice is uniform. No state, civilized or semi-civilized, will surrender a refugee charged with an offence purely political; and this position was as firmly asserted by Turkey, when called upon in 1845 by Austria to surrender Hungarian refugees, as it has been by England and the United States. The difficulties that arise are as to offences that are instigated in part by political motives, but which involve action which belligerents by the law of nations are not justified in taking, or which is not permitted to revolutionists according to the laws of civilized warfare. And the better rule is that, in either of the cases just mentioned, extradition should be granted. Political motives, for instance, entered into the murder of Mr. Lincoln by Booth, and into the murder of Mr. Garfield by Guiteau; yet had either Booth or Guiteau escaped to England, or France, or Germany, there is no question that a demand for his surrender would have been granted. Difficulties may undoubtedly arise when the act with which the fugitive is charged is one with which a section of the population in the asylum state sympathizes. In 1879, for instance, when Hartmann, charged by the Russian government with having been concerned in a Nihilist conspiracy, was arrested in Paris on the demand of the Russian government, the French authorities found the only way of escaping from the dilemma in which they were placed was by raising question as to the proof of identity, and on this ground extradition was refused. But in most cases the test just given will be sufficient to decide questions of this class. An assassination, for instance, which the laws of civilized warfare would not permit to a belligerent insurgent, will be ground for extradition, while extradition would be refused for parties charged with publishing documents instigating a change of government, or even with attempting by force (supposing no means not permitted in civilized warfare be employed) to subvert the government to which they owe allegiance.

(4.) There should be no surrender unless there be probable cause of guilt, such at least as would justify the finding of a bill by a grand-jury; and the better opinion is that there should be no surrender unless the guilt of the offender is made out to the satisfaction of the surrendering sovereign. The case is not that of an ordinary binding over or presentment to a domestic court. It is the surrendering of a visitor, it may be of a subject, to a foreign state over whose course of procedure we have no control.

(5.) Unless made imperative by treaty, surrender will not be made to a state in which punishments are inflicted arbitrarily and capriciously.

(6.) In some treaties it is provided that a party surrendered is only to be tried for the offence for which the demand is made; where there is no treaty this is sometimes stipulated by the demanding state. Where there is no such stipulation, the demanding state should see that this high prerogative is not abused for the purpose of private revenge or cupidity. It is possible that a prosecution for an extraditable offence may be got up only to enable a civil writ to be served, or a prosecution for an offence not extraditable to be brought. In such case, even though the asylum state should surrender, the state receiving the fugitive should quash all other proceedings against him except that for which he is extradited.

Literature. The following works bearing on the subject of the text may be consulted for further information: *Commentaries on the Conflict of Laws, Foreign and Domestic, in regard to Contracts, Rights, and Remedies.* By Hon. Joseph Story (8th ed., Boston, 1882). *Introduction to the Study of International Law.* By Theodore D. Woolsey (N. Y., 1879). *Draft Outlines of an International Code.* By David Dudley Field (2d ed., N. Y., 1876). *Maritime International Law.* By Rear-Admiral J. A. Dahlgren, U. S. N. (Boston, 1877). *American Inter-State Law.* By David Rorer (Chicago, 1879). *Treatise on the Conflict of Laws, or Private International Law.* By Francis Wharton, LL. D. (Phila., 1881). *Commentaire sur les éléments du droit International de Henry Wheaton.* Par William Beach Lawrence (vols. I.–IV. Leipzig, 1880). *Lectures on International Law.* By Sheldon Amos (London, 1874). *Commentaries upon International Law.* By Sir Robert Phillimore, D. C. L. (4th ed., 1884–85). *Kent's Commentary on International Law.* Edited by J. T. Abdy (2d ed., London, 1878). *The Institutes of the Law of Nations; a Treatise on the jural relations of separate political communities.* By James Lorimer, LL. D. (Edinburgh, 1882). *Halleck's International Law.* Edited by Sir Sherston

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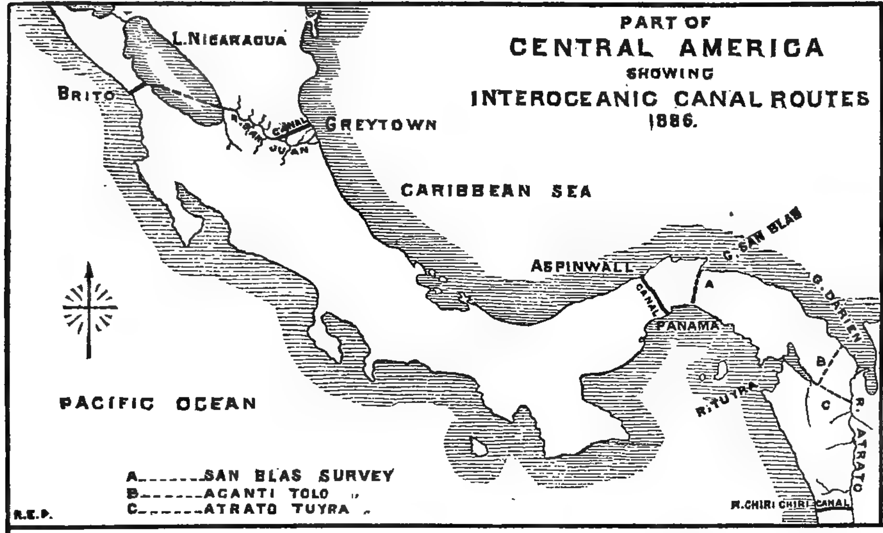
INTER-OCEANIC CANALS. The question of Inter-oceanic Canals across the American Isthmus is properly regarded as one of the foremost engineering problems of the present time. Important surveys and investigations have been made and actual operations have been inaugurated within the last few years. In the year 1873 the President of the United States appointed a commission composed of the chief engineer U. S. army, the superintendent of the U. S. coast survey, and the chief of the bureau of navigation in the navy department, for the purpose of examining the whole subject of ship-canal communication between the Atlantic and Pacific across the American Isthmus. The unsuccessful attempts made at various points in search of a practicable route, by both public and private exploring parties, received due but brief consideration. The Tehuantepec route surveyed by a U. S. expedition under Capt. Shufeldt, U. S. navy, in 1872, was not favorably considered on account of its great length, its high summit level (732 feet above sea-level), its 140 locks, and insufficient water-supply. The discussion was finally narrowed down to the Nicaragua and Atrato-Napipi routes (described in the ENCYCLOPÆDIA BRITANNICA, Vol. IV.), as possessing greater advantages for the construction of a canal. At the request of the commission a party of army and civilian engineers, with Prof. Mitchell, of the coast survey, was directed to make a personal examination of these routes and report their views to the commission. The result of that examination showed conclusively that further surveys were necessary before final judgment could be passed on that important subject, and in consequence thereof two expeditions were despatched in the latter part of 1874, one under Lieut. Frederick Collins, U. S. navy, who had served under Commander Selfridge, to resurvey the Atrato-Napipi route; the other under Commander E. P. Lull, U. S. navy, to ascertain the practicability of a ship-canal between the Bay of Colon (Aspinwall) and the Bay of Panama.

Lieut. Collins made a relocation of that route, from a point on the west bank of the river Atrato, 10 miles below the mouth of the Napipi, to Chiri-Chiri on the Pacific. The total length of the new route is 30¼ miles, of which 3½ miles are in tunnel. East of the tunnel deep-cutting, averaging 90 feet, extends for 4.8 miles. The summit-level is placed at 143 feet above mean tide; 22 locks being recommended to overcome that elevation. The bar at the mouth of the Atrato would have to be removed, and an artificial harbor constructed at Chiri-Chiri, now open to all winds from the N. W. and S. W. The estimated cost of the canal and its accessories is $98,194,394, including 25 per cent. for contingencies. Commander Lull's expedition, composed of two well-organized parties, made a careful examination of the valleys of the rivers Chagres, Obispo, and Rio Grande. A sea-level canal was regarded as impracticable on account of its great cost and the serious engineering difficulties involved in the problem of controlling the waters of the river Chagres, a torrential stream rising 40 or more feet in times of freshet, the bed of which would have to be occupied by a tide-level canal for a distance of about 30 miles. A lock canal was, therefore, located from Aspinwall to Panama. It follows generally the valley of the Chagres to the junction with the Obispo, and thence the valley of the latter to the summit of the divide, 294 feet above the sea, descending on the Pacific slope through the Valley of the Rio Grande to the Bay of Panama. It was proposed to cross the River Chagres by a viaduct 1900 feet long, and sufficiently elevated to allow the free flow of the flood-waters under it. The surface of the water in the viaduct was assumed as the summit-level of the canal, 123.75 feet above tide-water, and was to be overcome by 24 locks. In addition, a tidal-lock would be necessary on the Pacific side. Length of canal from sea to sea, 41.7 miles, with 9200 lineal feet of dredging in the Bay of Panama and 1800 feet at Aspinwall. To supply the canal with water it was proposed to dam the Chagres 12 miles above the viaduct, and raise its waters 36 feet above ordinary level, and from the basin thus formed to construct an aqueduct 10.2 miles long, of which 2½ miles would be in tunnels. The cost of the canal and its accessories was estimated at $94,511,360. The dimensions of the canal and the prices adopted were, for the purpose of comparison, similar to those used for the Nicaragua route, although the conditions were reported to be dissimilar in many important respects, making the probable cost of the work twice as great as that of the canal located in Nicaragua.

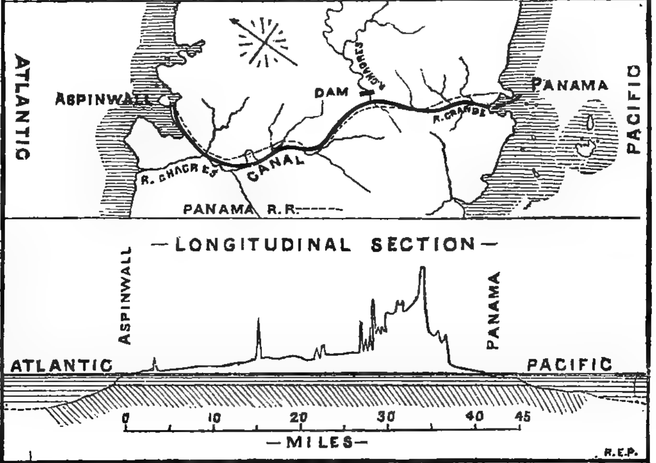
On the completion of these surveys the Inter-oceanic Canal Commission resumed its deliberations, and on Feb. 7, 1876, submitted its report to the President of the United States, to the effect that the Nicaragua route, extending from the harbor of Greytown, in the Caribbean Sea, to what is called the Port of Brito, on the Pacific, as located by the U. S. Surveying Expeditions in 1872–73, possessed "both for construction and maintenance of a canal greater advantages, and offers fewer difficulties from engineering, commercial, and economic points of view, than any one of the other routes shown to be practicable by surveys sufficiently in detail to enable a judgment to be formed of their relative merits." The commission was of the opinion that the total cost of the canal and its accessories would not exceed $100,000,000.

The Panama Tide-Level Canal.—The great prominence lately attained by this route, where a canal is now in process of construction under the management of M. de Lesseps, calls for a brief statement of the steps which led to its adoption and the inception of the work.

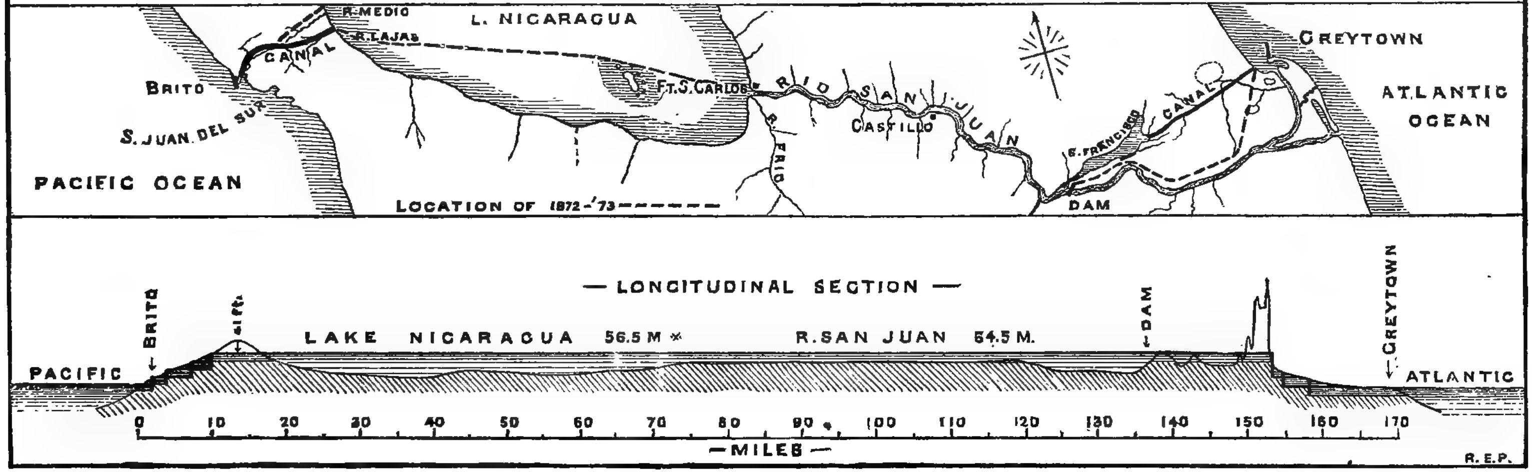
In the year 1876 a society was organized in Paris, under the leadership of Gen. Turr, named "Société Internationale du Canal Interocéanique," for the purpose of making explorations on the Isthmus of Darien. Lieut. L. B. Wyse, of the French navy, was appointed commander of the expedition and instructed to examine, first, the route by way of the Atrato, Cacarica, and Paya Rivers, which had been proposed by M. Gorgosa, and in case of insurmountable difficulties by this line he was then to explore any route that seemed feasible "to the south and east of the line joining Capes Tiburon and Garachini." Lieut. Wyse was accompanied by 17 assistants, comprising Lieut. Reclus, of the French navy, engineers, naturalists, etc., and 2 engineers delegated by the Colombian government. The explorations were commenced on the Pacific coast about the middle of December, 1876, and continued until the first part of April, 1877. M. Cellar, in charge of a party, reconnoitred as far as Loma de Cacarica, and Lieut. Wyse a route by the valleys of Tupisa, Tiate, and Acanti-Tolo; but neither of the parties penetrated as far as the Atlantic coast. The expedition then returned to Europe. In October, 1877, Lieut. Wyse was authorized by the society to return to the isthmus and complete the surveys previously commenced. He was also specially charged with the negotiations with the Colombian government regarding a concession. The second expedition was composed of Lieuts. Wyse and Reclus and 4 assistants. The party spent 2 weeks in a partial reconnoissance of the Pacific end of the San Blas route. and about 3 weeks in fur-



PANAMA SHIP CANAL



NICARAGUA SHIP CANAL



ther explorations in Southern Darien, but without accomplishing any definite results. It then returned to Panama, where Lieut. Reclus took charge of the explorations, while Lieut. Wyse proceeded to Bogota. The former, with one assistant, made some reconnoissance of the valleys of the Rivers Obispo, Chagres, and Grande, and returned to France April 30; Lieut. Wyse, having in the mean time accomplished the object of his mission, following soon thereafter. From these explorations plans were devised as follows: (1.) A lock canal via the Atrato, the Caquerri, and the Tuyra; length, 128 kilometers; height of summit, 50 meters; number of locks, 22. A lake formed by dams in the valley of the Tuyra is assumed as the summit-level; estimated cost, 700,000,000 francs. (2.) A tide-level canal via the Tupisa, the Tiati, and the Acanti-Tolo; length, including tunnel, 74 kilometers; length of tunnel, 17 kilometers; estimated cost, 600,000,000 francs. (3.) San Blas tide-level canal, via the Boyano, Mamoni, and Nercalegua Rivers; length, 41.5 kilometers; length of tunnel, 15.8 kilometers; estimated cost, 475,000,000 francs. (4.) Panama tide-level canal, via the Chagres, the Obispo, and the Rio Grande; length, 73.2 kilometers; length of tunnel, 7720 meters; estimated cost, 475,000,000 francs.

M. de Lesseps, who had taken an active interest in the work of the "Société Internationale du Canal Interocéanique," then issued invitations through the Geographical Society of Paris for an international conference to be held at Paris, for the purpose of deciding upon the best route for an interoceanic canal. The conference was composed of 136 members, of whom 74 were French and 62 of different nationalities; of the total number 42 were engineers. The Congress met on the 15th of May, 1879, and after its preliminary organization, M. de Lesseps took the chair; he then announced the committees, and laid out their work. Five committees were appointed, viz.: (1) Statistics; (2) Economic and commercial; (3) Navigation; (4) Technical; (5) Ways and means. The routes surveyed by the various U. S. surveying expeditions were presented by the delegates from that country, and Messrs. Wyse and Reclus advocated those routes above enumerated, and a new one at Panama without tunnel. The struggle between the advocates of the different routes took place at the meetings of the fourth committee, upon whose report the decision of the conference would be based. The meetings of the committees continued from day to day until the 29th, when the following resolution was put to a vote: "The conference deems the construction of an interoceanic canal, so desirable in the interest of commerce and navigation, as possible, and, in order to have the indispensable facilities of ease of access and of use which a work of this kind should offer before all others, it should be built from the Gulf of Limon to the Bay of Panama." This resolution was carried by the vote of 78 members, 19 of whom were engineers and professional men. The route adopted was the Wyse–Reclus sea-level canal, without tunnel. The technical committee fixed the cost, based on a cube of 46,000,000 cubic meters, reported by the promoters, at 1,044,000,000 francs, declaring, however, that the data were insufficient to determine the approximate cost of the work. The designers proposed to control the floods of the Chagres by constructing a dam about 150 feet high just above the point where the canal enters the valley of the river, the accumulated water in the receiving basin to be conveyed to the sea by an artificial channel. This part of the work was estimated at 42,000,000 francs. Satisfactory arrangements having been completed for the transfer of the Wyse concession by the "Société Internationale du Canal Interocéanique" to M. de Lesseps, the latter soon after made an appeal to the public for funds for the construction of the work. There was a general public impression that the estimate of the Congress could not be relied upon, on the ground that the route had not been sufficiently surveyed; and the subscription failed, 20 per cent. only of the amount called for being subscribed. M. de Lesseps then decided to organize an "International Technical Commission," and with it go to Panama for the purpose of making a personal examination of the ground. The commission was composed of 9 members, prominent among whom was Mr. Dercks, the engineer of the North Sea canal. The party landed at Panama on the last day of the year 1876, and remained on the isthmus for a period of 40 days. The sea-level canal was reported by the commission to be perfectly practicable, and the original design for the control of the River Chagres was adhered to; but the estimates of the Paris Congress were greatly modified, so as to conform to new developments brought out by the inspection of the ground and new computations of the work required. The total cube of excavation was increased from 46,000,000 cubic meters, estimated for by the Congress, to 75,000,000 cubic meters; and the expenses connected with the control of the Chagres, including the artificial channels, were raised from 42,000,000 francs to 175,000,000 francs. The total estimated cost of the work, including 10 per cent. for contingencies, but exclusive of interest during construction and administrative expenses, was put down at 843,700,000 francs. This estimate was afterwards revised and reduced by M. de Lesseps to 658,000,000 francs. In July, 1880, another appeal was made to the public for funds; the "Prospectus" said: "The Universal Company shall be constituted with a capital of 300,000,000 francs. It being estimated that the total expense will reach 600,000,000 francs, the sums necessary to make up the difference will be provided as the work proceeds by the issue of debentures." This time M. de Lesseps met with extraordinary success; the number of shares offered was 590,000, and the subscription amounted to 1,206,609 shares. The present Panama Canal Company was at once organized, and immediate preparations made for an early and speedy prosecution of the work. The route finally adopted is practically the same as recommended by Lieut. Wyse. The length from sea to sea is 45.5 miles. The dimensions of the canal are, for the main portion of the line: width at bottom 72 feet, at water-line 164 feet; uniform depth 28 feet below mean low tide. Through the heavy cutting the dimensions are: width at bottom 79 feet, at water-line 85.5 feet; depth 29.4 feet. Deep cutting extends for about 15½ miles, the maximum depth at the divide being 333 feet in the axis of the canal. M. de Lesseps has announced that the canal will be completed and opened to the traffic of the world in the year 1888. Eminent engineers, however, are of the opinion that the work can only be accomplished by a much greater expenditure of money and in a much longer time than that originally estimated. The practicability of the sea-level canal, it is generally admitted, depends on the effectual control of the floods of the river Chagres, a problem not yet solved. Borings taken at the site of the proposed dam, 132 feet high and nearly a mile long, fail to show rock foundations at great depth. The construction of an immense embankment, formed with the detritus proceeding from the excavations, has been suggested to take the place of the masonry dam; but nothing definite has yet been decided upon, and that most important work—the key of the problem—has not yet been attacked. The work of surveys, erection of shops, quarters for employés, and other preparations were commenced at the latter end of 1881, and that of actual excavation in 1882. This work has been continued at several points along the line, with more or less vigor, and up to May 1, 1885, the total out-put of excavation reported by the company amounts to 12,376.500 cubic meters, out of a total of 125,000,000 cubic meters officially reported as required for the canal and accessories. The tide-lock, the breakwater at Aspinwall, and the excavations in the Bay of Panama have not yet been commenced.

The cash spent up to May, 1885, exceeds 500,000,000 francs, and the obligations contracted amount to 766,192,500 francs, on which the company pays an annual interest of 30,500,000 francs. A very large and valuable plant has been imported on the isthmus, and the preparations, in work-shops, hospitals, means of transportation, etc., seem to be sufficient and well designed for a vigorous prosecution of the work. The time of final completion and the ultimate cost of the canal are, however, problems at present involved in much doubt. It is the opinion of experts who have recently visited the works that not more than from 6 to 10 per cent. of the total excavation required had been accomplished up to May, 1885. From that date to the end of the year but little progress was made on account of interruptions caused by the rainy season, an extraordinary flood in the River Chagres, and a disastrous storm in the Bay of Aspinwall in the month of December.

Nicaragua Route.—Since the route was located by the U. S. surveying expedition of 1872–73, as described in ENCYCLOPÆDIA BRITANNICA, Vol. IV., radical changes have been made both in the location and design for the canal. The route extending from the mouth of the River Lajas on Lake Nicaragua to the port of Brito on the Pacific, which had been surveyed by Col. C. W. Childs in 1850, and again by the expedition of 1872–73, has been finally adopted in place of that by the River Del Medio. The latter route, with an extreme depth of cutting of 134 feet, the estimated cost of which exceeded by several millions that of the Lajas, with but 41¼ feet maximum depth of cutting, had been recommended by reason of better natural surface-drainage. In the year 1880 Civil-Engineer A. G. Menocal, U. S. N., who had been chief-engineer of the U. S. surveying expedition at Nicaragua and Panama, made additional surveys and located an artificial channel and a dam about 40 feet high, by which the Rio Grande, now discharging into the Pacific at Brito, can be diverted into the lake, thus leaving its channel below the dam free for the construction of the canal. Mr. Menocal had also made several local surveys and reconnoissances in the valley of the River San Juan, showing that a location far more favorable than that of 1872–73 could be effected by taking the canal from the immediate vicinity of the River San Juan and carrying it in a nearly straight line from the River San Juan, below the confluence of the River San Carlos, to Greytown. A saving of eleven miles of canal, a greatly reduced surface drainage, and an improved system of slack-water navigation by the River San Juan were expected to be accomplished by the change. In December, 1884, the U. S. government sent a party in charge of Mr. Menocal to make an instrumental location of modifications suggested by his previous examination. The following route, possessing striking advantages over those previously recommended, has been finally located and recommended for construction:

The proposed canal extends from the harbor of San Juan del Norte, or Greytown, on the Caribbean Sea, to the port of Brito on the Pacific, a total distance of 169.8 miles; of which 40.3 miles are canal in excavation, and 129.5 miles open navigation through Lake Nicaragua, the River San Juan, and the basin of the River San Francisco, a tributary of the San Juan. Lake Nicaragua, some 90 miles long by about 40 miles wide, the surface of which is 110 feet above sea-level, has been taken as the summit-level of the canal. Leaving the harbor of Brito the canal follows the valley of the Rio Grande, with a gradual inclination of about 12 feet to the mile, ascending by means of four locks, 26 to 29 feet lift, to the summit-level, extending 8½ miles west of the lake. From that point the canal extends easterly, and cutting across the divide, with a maximum depth of 41.4 feet above the surface of the water, reaches the lake 17.27 miles from the Pacific terminus. The summit of the divide, cut through by the canal, 151.4 feet above sea-level, is the lowest depression across the American isthmus. The lake navigation extends from the mouth of the River Lajas to Fort San Carlos at the head of the River San Juan, through that distance not less than 28 feet of water can be carried to within 2400 feet of the west shore and 8 miles of Fort San Carlos. For the former distance dredging and rock excavation are necessary, and in the latter dredging in mud to an average depth of 3½ feet to extend deep water from shore to shore. Other parts of the lake are very deep. The canal then follows the River San Juan for a distance of 64 miles from the lake to Ochoa, just below the confluence of the River San Carlos. Here a dam is proposed, 1255 feet long and 52 feet high, which will back the water of the river the entire distance to the lake, maintaining the water of the latter at the proposed level of 110 feet. The upper part of the river thus deepened and widened will be converted into an extension of the lake at no place less than 1000 feet wide, and, with the exception of the first 28 miles from the lake, with gradually increasing depth from 28 to 130 feet. Within those 28 miles dredging and rock excavation to an average depth of 4 feet will be needed for a distance of 24 miles. The dam is located between rock abutments, and is proposed to be built of concrete resting on rock foundations 20 feet below the present water-level. Just above the dam a break in the hills confining the river on the north affords a desirable basin at the entrance of the canal, which here leaves the river. After running a distance of 3300 feet through the basin it cuts across a broken country for a distance of 1.82 miles and enters the valley of the River San Francisco. This river runs nearly parallel to the San Juan, from which it is separated by a range of hills, to a point about 9 miles from the dam; then, receiving a tributary from the north-east, turns abruptly to the south and empties into the San Juan. Its valley forms an irregular flattened Y, with its foot resting on the San Juan, one arm extending westerly to within a short distance of the dam at Ochoa, the other easterly in the direction of Greytown. Across the stem of this Y will be built an embankment 6500 feet long on the crest, and a maximum depth of 51 feet. This embankment will retain the waters of the San Francisco, forming an artificial lake of 30 to 50 feet depth at the level of the river above the dam, or an extension of the summit-level. The canal route follows this deep basin to the western slope of the dividing ridge between the Rivers San Francisco and San Juanillo, 12.55 miles from the dam and 19.48 from Greytown. Beginning at the eastern extremity of this basin the canal cuts through the dividing ridge, the summit of which is 280 feet above sea-level, and in a distance of 14,200 feet, in which the average depth of the cutting is 119 feet above the water in the canal, strikes the eastern slope of the divide. This point is the eastern terminus of the summit-level extending from the upper lock on the Pacific slope, a distance of 144.8 miles. Here it is proposed to cut in the solid rock—at the end of the deep cut referred to—the upper lock of the eastern branch, which drops the level of the canal 53 feet. The ground thence descends gradually to the next lock, 4600 feet below, where another drop of 27 feet takes place; and the canal for a distance of 15,000 feet is cut through a broad, slightly inclined valley to the third and last lock. This lock lowers the canal to the level of the sea, and from here it takes a direct course through the alluvial plains of the San Juanillo to the harbor of San Juan del Norte, or Greytown, a distance of 61,000 feet. From the last lock to Greytown on the east, and to Brito on the west side, the canal is enlarged, forming extensions of the harbors, where vessels can pass each other without detention. Ample provisions have been made to protect the canal from surface drainage. Basins are proposed at the ends of each lock, where vessels can wait or pass each other without delay.

The canal is proposed to be 80 feet wide at the bottom in deep cuts, and 120 feet in the terminal cuts and other enlarged sections, the width at the surface of the water being 80 feet in deep rock cuts, and 184, 288, and 342 feet at other points. The locks are estimated 650 feet long between mitre sills, and 65 feet width of chamber. The estimated time of transit from sea to sea, on the basis of a speed of 5 miles per hour in the canal proper, 8 and 10 miles per hour on the river and lake, and 45 minutes detention at each of the 7 locks, is 30 hours. Allowing but one vessel to each lockage, 32 vessels in one day, or 11,680 in one year, can be passed through the canal.

Breakwaters and dredging will be required at the harbors of Brito and Greytown to secure a free entrance to the canal.

It is estimated that the canal and its accessories can be completed in six years, and its cost, including 25 per cent. for contingencies, is put down at $64,043,697.

Reference is made to the following documents: *Official Reports of the Surveys of the Atrato-Napipi and Panama Ship-Canal Routes.* By Lieut. P. Collins, U. S. N., and Commander E. P. Lull, U. S. N. (1875). *Report of the U. S. Canal Commission* (Feb. 7, 1876). *Summary Report of the Expeditions* (1877–78). By Lieut. L. N. B. Wyse, Commandant. *Congress International D'Etudes—Compte-Rendu des Séances* (1879). *Reports of Relocation of Nicaragua Ship-Canal Route.* By A. G. Menocal, U. S. N. (1880–85). (A. G. M.)

INUNDATIONS. One of the greatest sources of disaster to which man has been exposed throughout his whole history is the overflow of the land by the waters of streams and seas. History and tradition are full of tales of immense injury from this cause, the more injurious the greater the population and more advanced the civilization of the region devastated. The deluge of the Hebrew Scriptures is paralleled by similar accounts of great floods in the early history of almost every people, which have made a deeper impression on their memories than any other events of their history. Later times are full of tales of like disasters, very far too numerous to particularize. We can here but briefly describe their causes and general character.

Inundations are due to two general causes, the overflow of streams and the invasion of the ocean. The latter may arise from a great earthquake shock, which hurls a vast ocean wave on the bordering land. A striking instance is the eruption of Krakatoa in 1883, with the disastrous flooding of the coast of Java. Another cause may be a violent storm, with a wind blowing on shore, or even a persistent wind opposing the downflow of a stream. Thus easterly winds sometimes cause a flood in the Orinoco, by checking its current, and the very regular flow of the St. Lawrence has, by a westerly wind, been raised six feet at its junction with Lake Erie. Like causes have produced terrible overflows at the mouth of the Ganges in India, while in the Netherlands, where the land lies below the sea-level, the dikes and downs have been frequently pierced by ocean storms, and every century tells of several terrible inundations of this "hollow land." The Zuyder Zee is one result of such inundations. Throughout the Netherlands more than a million acres have been in the recent centuries taken captive by the ocean, though much has been gained back by the vast dikes that border the land.

The flooding action of rivers is an annual and in some streams a semi-annual phenomenon. The great flood occurs in the spring, and is due to the melting of the mountain snows, while a lesser one may occur in the autumn from the great seasonal rains. All the great rivers have their annual floods, though the disastrous overflows are of comparatively rare occurrence. Among the most regular of them all is the rise of the Nile, whose yearly overflow has been so wisely utilized. In Asia the Tigris and Euphrates, the Ganges and Indus, and the great rivers of China, have their annual or semi-annual floods, sometimes so high as to occasion terrible disasters. The same is the case with the great rivers of South America, the Amazon rising 40 or even 50 feet, and overflowing a vast extent of country. The Orinoco, when in flood, sometimes converts a region 600 miles long and 60 to 90 wide into a lake of 12 or 14 feet depth. The Mississippi has its spring and autumn rise, the great flood lasting usually from April to June, the water sometimes rising in part of its course to a height of 40 or 50 feet, and overflowing a region of 30 miles in width. Such was the case in the great inundations of 1782 and 1828. Since then the system of levees has restrained the flood and reduced the extent of its irruptions, yet the thicker settlement of the valley has rendered the floods more disastrous than of old. Similar ruinous floods occur in its great tributary, the Ohio, the greatest known being due to the excessive rains of February, 1884, when the river rose, on Feb. 14, 71 feet ¾ inch at Cincinnati, and caused terrible loss throughout its lower valley.

The streams of Europe, being smaller in size and in drainage area, are less regular in their rise. Yet occasionally they swell with extraordinary rapidity, while the dense population of their valleys causes their overflow to be terribly ruinous. Such was the case in the great floods of the Loire and Rhone in 1856, in the Rhine and Elbe in 1884, and in many others that might be enumerated.

Whether river inundations are becoming more disastrous of late years is a question much mooted, while how best to guard against their injurious effects is a question of serious importance. Greater disaster of course necessarily results from the greater density of population, and from the more valuable material offered by high civilization to the ravages of the waters. Yet observers are, with good reason, of the opinion that the cutting down of mountain forests has greatly intensified the causes of floods by removing the natural restraint to the rapid drainage of rain and snow water. The soil of forests has certainly a great retaining effect, and permits the slow percolation of rain water to its springs and streams, tending to keep these uniform in volume and to prevent the great variations in level of the rivers which they feed. The destruction of the forests causes the loss of the restraining vegetable mould and the gradual denudation of soil from the rocks, so that the waters of severe rains or melting snows rush at once to the streams and fill them with dangerous suddenness. It also exposes the snows more directly to the solar rays, and promotes a much more rapid melting. Again, the waters which flow down denuded rocks lack the fertilizing material by which overflowing streams may partly repay their damage, but tend to bring down sands and gravels as a deposit on the fertile soil.

It is claimed, then, that one important cure of the evil of inundations will be to restrict the removal of the forests and to replant them where necessary. This has been done to some extent in France, and the hills scarped and terraced to check the descent of the waters with very good effect. Another method of wide employment is the embanking of rivers, so as to hold back their flood-waters. This method has its good and its evil side. It keeps from the land a great wealth of fertilizing material and it promotes the silting up of the bed of the stream, so that the river gradually rises in comparison with the surrounding country. Such is markedly the case with the Po, of Italy. Here, despite the banks, an occasional flood breaks through, with a wide overflow of the low-lying plain. On the other hand regularly overflowing rivers raise the level of their bottom lands and render their floods less ruinous. The system of embankments has been largely practised on the Mississippi and has undoubtedly prevented many inundations. To what extent it is raising the level of the river bed remains to be determined. Many engineers now recommend low dikes which the current will overflow when unusually high, both raising the lowlands and enriching them by the deposition of sediment. Another proposal is the building of great reservoirs on the upper course of streams to receive and hold back their waters in the season of flood, and give it out gradually to the stream in the season of low waters. Such a system would undoubtedly be very efficacious on many streams by diminishing the irregularity of their flow. But it would be very difficult of application on the larger streams, as on the Mississippi, to which it is now proposed to apply it.

One of the greatest difficulties which man experiences in his struggle with nature is the irregularity of phenomena. This is particularly the case with the descent of atmospheric water and its flow to the ocean, so that what is beneficial in the main becomes ruinous both in its excess and in its diminution. Nature has done much towards overcoming this irregularity of river flow, by retarding the movement of waters through the various influences of the forest, as also by the action of marsh lands, of irregularities of surface, and other restraining agencies. Human civilization has done its utmost to counteract these conditions of nature. The forests have been cut down, the marshes drained, the land surface levelled, the soil underdrained: every means have been taken to promote the rapid flow of storm water into the streams. The evil thus done may be partly overcome by re-foresting the hills, by embankments, and reservoirs, yet while nature continues irregular in her activities man must always be exposed to peril from flood, though by judicious preparation he can undoubtedly diminish the danger. (See FORESTRY.) (C. M.)

See Vol. XIII. p. 213 Am. ed. (p. 207 Edin. ed.).

IOWA was admitted into the Union in 1846, being the sixteenth State admitted since the adoption of the Federal Constitution. It ranks twenty-third in area and is the tenth in population, according to the census of 1880, which gives its area as 55,045 square miles, or 35,228,800 acres; and its population as 1,624,620. It is one of the most fertile of the prairie States, and though only forty years old in 1886 it then ranked first in swine; second in milch-cows, in oxen and other cattle, in corn, in hay, and in oats; it ranked third in horses, fifth in barley and in the number of miles of railway, sixth in potatoes and in rye, and seventh in wheat and in coal. Since 1833 the settlement of the State has been rapid and substantial; many of the first comers were from Illinois and Indiana, men who had served apprenticeship in prairie countries and knew how to avoid mistakes and take advantage of facilities, and hence were able to push forward in the development of the resources of the State more expeditiously than their fellow-settlers in the more eastern of the prairie regions. From the first the State has been noted for the high morality, the energy, and industry of its inhabitants, and much of its present prosperity may be traced to these qualities in the first settlers. The climate and soil are substantially the same as in Illinois (see ILLINOIS).

OUR LIBERTIES WE PRIZE AND OUR RIGHTS WE WILL MAINTAIN

Agriculture is the main industry. The facilities for successful culture of the soil are unsurpassed by any State in the Union, and no State equals it as a purely agricultural State. The topography, natural drainage, and inexhaustible fertility of the soil and climate give advantages that are rare. The dividing ridge between the Mississippi and Missouri Rivers passes through the western part of the State, and the numerous tributaries to each stream give ample drainage. In recent years much attention has been given to planting trees. For statistics of the farms of Iowa in 1880 see FARMS. The average annual crop products for eight years, from 1872 to 1879 inclusive, is shown below.

Crop.	Bushels.	Acres.	Bushels per acre.	Price per bushel.	Price per acre.	Total value.
Corn	142,731,825	4,229,245	33.9	$0.26	$8.61	$36,380,133
Wheat	29,878,230	2,794,352	10.9	.77	8.45	22,927,414
Hay	(*a*) 2,338,300	1,639,221	(*a*) 1.40	(*a*) 5.31	7.30	11,786,991
Oats	28,444,150	826,743	34.2	.23	7.71	2,950,511
Potatoes	7,389,025	84,359	88.0	.45	34.82	2,440,410
Barley	4,774,625	214,168	23.5	.54	11.33	216,200
Rye	475,663	27,823	17.0	.47	7.88	95,033
Buckwheat	131,600	8,383	15.8	.73	11.38	96,068

(*a*) Ton.

The average annual production of the principal vegetables for five years, 1878–83, was as follows: Corn, 56,613,803 bushels; wheat, 21,954,892 bushels; rye, 593,476 bushels; oats, 10,819,096 bushels; barley, 2,080,426 bushels; buckwheat, 124,241 bushels; potatoes, 4,017,772 bushels; hay, 13,990,415 tons. The average annual value of all products for the same period was $114,214,232. The following table exhibits the statistics of some of these crops for 1884:

Crop.	Average price.	Acres.	Bushels.	Value.
Corn	$0.24	7,549,542	242,496,000	$58,199,040
Wheat	.67	2,683,944	30,332,000	20,322,440
Oats	.22	2,210,338	74,718,000	16,437,960
Flax	......	300,000	2,700,000	

Besides the foregoing crops, hemp and hops are cultivated to a considerable extent. Apples also are largely raised, and pears and grapes are grown successfully. The live-stock of the State according to late reports is as follows:

Stock.	Number.	Average price.	Total value.
Horses	778,400	$55.79	$42,959,896
Milch-cows	724,500	24.20	17,532,900
Other cattle	1,370,400	19.44	26,640,576
Sheep	454,400	2.54	1,154,176
Hogs	2,778,400	5.36	14,892,224

The number of all cattle, exclusive of milch-cows, had increased to 3,664,440 in 1886. The number of milch-cows was nearly 1,000,000 in the same year.

Minerals.—The principal mineral of the State is coal. For particulars see COAL, Vol. II., p. 200. The following table exhibits the coal production for recent years:

Years.	Long tons.	Years.	Long tons.
1873	350,000	1879	1,600,000
1874	500,000	1880	1,600,000
1875	1,000,000	1881	1,750,000
1876	1,500,000	1882	3,500,000
1877	1,500,000	1883	3,881,300
1878	1,500,000	1884	3,903,458

A portion of the Galena belt of lead extends into the north-eastern part of the State. The mines in the vicinity of Dubuque are the most extensively worked, and about 5,000,000 pounds are smelted annually, yielding about 70 per cent. of lead. Small deposits of iron-ore are found in different parts of the State. A large bed of very pure gypsum exists near Fort Dodge. Various kinds of clays and abundance of limestone are found in many places.

Railroads.—The State is well supplied with rail facilities for transporting its products. The main lines which connect the West and East pass through it with terminal branches to all places of commercial importance. Within the last few years many roads have been built north and south, so that now every point in any direction is readily reached by rail. The number of miles in operation in 1879 was 4779; in 1880, 5401; in 1881, 6165; in 1882, 6968; in 1886, the number of miles was nearly 9000. The land granted to railroads in the State from 1854 to 1884 aggregate 4,706,618.39 acres.

Manufactures.—The condition of the manufacturing interests of the State is what might be expected in a State so new and given so largely to agriculture. The principal manufactures are in agricultural implements, blacksmithing, boots and shoes, carriages and wagons, furniture, pork-packing, woollen goods, etc. The following table exhibits the manufacturing interests for the year 1880·

Industries.	Establishments.	Capital invested.	Hands employed.	Wages paid.	Value of materials.	Value of products.
Agricultural implements	58	$1,185,530	810	$243,635	$601,096	$1,271,872
Bakery products	97	353,633	271	134,662	541,629	839,712
Brick and tile	280	478,614	2,351	425,120	270,963	944,497
Bridges	8	685,000	138	87,808	242,858	351,476
Carriages and wagons	208	1,505,645	1,378	610,017	1,042,758	2,212,197
Cheese and butter.	244	657,508	810	139,813	1,261,316	1,736,400
Clothing.	187	665,363	892	353,100	830,510	1,508,398
Cooperage	112	194,539	519	207,573	312,066	660,213
Flour-mills	713	7,890,859	2,147	748,045	16,488,480	19,089,401
Foundries	102	1,032,550	1,106	471,574	747,559	1,594,349
Furniture	169	744,670	752	314,752	626,453	1,293,504
Liquors, distilled	3	118,200	75	20,000	192,338	288,000
Liquors, malt	114	1,987,343	526	218,017	928,135	1,653,851
Lumber, planed	12	94,600	101	42,633	161,500	256,800
Lumber, sawed	328	4,946,390	2,989	825,244	4,141,885	6,185,628
Oil, linseed	7	432,000	97	46,330	570,812	766,800
Marble	85	240,970	321	142,200	186,119	499,744
Publishing	146	1,125,086	990	498,229	514,380	1,399,289
Saddlery	451	964,728	1,009	380,552	1,173,862	2,068,486
Sash, doors	27	713,200	621	238,592	847,002	1,286,072
Meat-packing	38	1,955,500	1,532	530,188	9,996,845	11,285,032
Soap, etc	15	135,500	64	23,418	195,800	259,960
Tinware, etc.	321	520,150	620	256,266	583,786	1,198,804
Tobacco, etc	133	263,675	578	226,961	376,621	830,097
Wire	3	131,000	46	35,135	319,350	447,500
Woollen goods	34	553,500	498	117,792	435,747	679,904
All others	3,046	4,411,533	6,152	2,387,306	5,114,441	10,437,940
Total	6,921	$33,987,886	28,372	$9,725,962	$48,704,311	$71,045,926

Wealth, Debt, Taxation.—The assessed valuation of the State in 1880 was $112,363,473 on personal property and $1,185,013,026 on realty; in 1886 it was nearly $2,500,000,000. A certain amount of real property has always been exempt from taxation, being granted by the State to persons planting and caring for a certain number of acres of shade trees; the value of lands thus exempted amounted, in 1880, to $7,325,887. The exemption runs for 5 or 10 years, according to number of acres cultivated. The debt of the State is insignificant, being only $245,435, and that entirely due to the school fund, bearing interest at 6 per cent. The total debt, bonded and floating, of the counties of the State is $2,932,376; of the cities, $3,257,210; of the school districts, $1,125,138. Like all Western States in which there are large transactions in real estate, live-stock, etc., Iowa is liberally supplied with banks. The number of the private banking firms is great; the number and standing of the 125 national banks reported in 1884 is as follows:

Loans and discounts	$21,324,486.47
Bonds for circulation	4,301,000.00
Bonds for deposits	350,000.00
U. S. bonds on hand	33,200.00
Other stocks and bonds	1,008,488.33
Due from reserve agents	2,739,833.63
Due from national banks	1,431,403.73
Real estate, etc	1,483,858.09
Due from State banks	249,616.78
Specie	1,218,851.00
Legal tender notes	1,166,647.00
Due from U. S. treasurer	262,480.33

Education.—The public-school system of the State is similar to that of all the later States of the Union. There is the threefold superintendence of State, county, and district. The support of the schools is from the same sources as that of other States. The act of Congress, March 3, 1845, setting aside the 16th section, brought 905,144 acres into the common-school fund; the same act gave 46,080 acres to universities and schools of higher education; the act of July 2, 1862, gave an additional grant of 240,000 acres to the common-school fund. The amount of the permanent school fund is $3,732,174, and of the available funds, $3,681,432. The school year begins Sept. 15 of each year and continues until the same date of the following year; the number of months actually taught varies, but the average is 142 days. The school population includes all from 5 to 21 years of age, and numbered in 1882, 604,739. The number of public schools in the same year was 406,947. The daily attendance of pupils was 253,688; the number of teachers was 22,081, of which 6,044 were male and 16,037 were female. The average salary of the males was $35.20 monthly, and of the females, $27.46. The income of the schools was $5,558,259, of which $463,825 was from State taxation, $4,851,298 from local taxes, 225,907 from interest of permanent funds, including rents of school lands, and $17,229 from all other sources. The total expense of the schools for the year was $5,525,449. The number of schools, teachers, and pupils of the schools for higher education in 1882 is shown in the following:

	Schools.	Teachers.	Pupils.
Normal	5	26	1,225
Commercial and business	14	56	2,462
Kindergarten	4	12	199
Secondary instruction	40	177	4,677
Preparatory	2	7	337
Superior instruction of women	3	40	696
Universities and colleges.	19	208	2,736
Schools of science	1	21	264
Theology	3	22	143
Medicine	3	36	434
Deaf and dumb	1	20	276
Blind	1	42	145
Reform schools	2	28	235
Orphan asylums	4	38	253

Religion.—There is perhaps no section of the Union where religion and morality prevail in a higher degree than in this State. The large proportion of the population dwelling in rural regions may account for this in part. Almost all denominations of evangelical Christians are found in the State. The number of church organizations, ministers, and members as reported to the commissioner of education in 1880 is found below:

Denomination.	Churches.	Clergymen.	Members.
Roman Catholic	160	198	120,000
Methodist Episcopal	764	512	77,952
Lutheran	342	192	42,250
Baptist, Regular	411	280	24,815
Presbyterian	344	246	20,281
Christian	207	131	19,200
Congregational	224	188	15,566
Friends	71	121	8,999
United Brethren	84	173	7,501
Evangelical Association	70	127	6,800
United Presbyterian	95	166	6,656
Dunkards	40	131	6,000
Reformed (German)	42	24	5,050
United Evangelical	22	20	4,210
Protestant Episcopal	51	42	3,829
Second Advent	28	25	3,400
Free Will Baptist	64	48	2,319
Methodist Protestant	23	54	2,280
American Communities	7	...	1,683
Free Methodist	29	72	1,415
Cumberland Presbyterian	34	19	1,388
Seventh Day Advent	58	11	1,200
Universalist	25	28	1,181
Reformed (Dutch)	9	7	1,169
Winebrennarian	50	40	1,000
Wesleyan Methodist	9	22	967
Moravians	4	5	346
Anti-Mission Baptist	5	6	200
Unitarian	3	6	200
Seventh-Day Baptist	2	2	125
Reformed Presbyterian.	2	1	100
Jews (whole number, 1245)	3	2	93

History.—The most important political event in the later history of the State was the submission to the popular vote of an amendment to the constitution of the State with reference to the liquor traffic. The amendment proposed an addition to Article I., section 26, of the constitution, as follows: "No person shall manufacture for sale, or sell, or keep for sale, as a beverage, any intoxicating liquors whatever, including ale, wine, and beer. The general assembly shall by law prescribe regulations for the enforcement of the prohibition herein contained, and shall thereby provide suitable penalties for the violations of the provisions hereof." A special election was held on June 27, 1882, to vote on this amendment. The result of the vote was, for the amendment, 155,436; against the amendment, 125,677. During the ensuing year a test case was carried to the Supreme Court of the State, and the law was there declared to be unconstitutional, or, rather, that because of a technicality it had been enacted unconstitutionally. At the first meeting of the general assembly after this act of the Supreme Court, in 1884–85. the following amendment to section 1555 of the statutes was enacted, and this constitutes the present prohibitory law of Iowa: "Wherever the words 'intoxicating liquors' occur in this chapter the same shall be construed to mean alcohol, ale, wine, beer, spirituous, vinous, and malt liquors, and all intoxicating liquors whatever, and no person shall manufacture for sale, or sell, or keep for sale as a beverage, any intoxicating liquors whatever, including ale, wine, and beer." (A. G. M.)

IOWA CITY, the seat of justice of Johnson co., Iowa, is pleasantly situated on the Iowa River, 120 miles by rail E. of Des Moines, the State capital. From 1837 to 1856 it was itself the State capital; but the old State buildings are now occupied by the State University, organized in 1860. The city has 12 churches, 2 national banks, several daily and weekly newspapers, and large and varied manufactures. It is on the main line of the Chicago, Rock Island, and Pacific Railroad, where it is crossed by a division of the Burlington, Cedar Rapids, and Northern Railroad. Population in 1870, 5914; in 1880, 7123.

IOWA COLLEGE, the oldest institution of this rank in the State, was incorporated 1847, and opened at Davenport, Scott county, 1848. Its founders and first trustees were nine Congregational ministers and two Presbyterian, with four laymen, nearly all graduates of New England colleges—Yale, Bowdoin, Amherst, University of Vermont, Middlebury, and Dartmouth. It has passed through two changes of campus, one of site, a fire destroying half its buildings, and a tornado sweeping away the whole, 1882. In eighteen months from this last disaster it was rebuilt, with one more edifice than before, and within two years had a fund for another. All its appointments are now superior to those lost. The library comprises over 10,000 volumes; the museum of natural history, three times arranged by the same professor, is the finest west of Lake Michigan.

Originally a college for young men, on the New England plan, young ladies were admitted in 1858, under advice of Hon. Horace Mann, as an experiment. In 1860, owing to enforced change of campus and losses, it was removed to Grinnell, Poweshiek county, where a local institution had been planned but not opened, whose property and subscriptions, of the estimated value of $25,000, were offered to the trustees as an inducement to do so. It was reopened at Grinnell in 1861, and young ladies were admitted to all departments of instruction. It now has three college courses, classical, philosophical, and literary (each of four years), the last originally a "ladies' course," and the last two at first of three years. It has also a three years' scientific course, on which it is hoped a scientific school will be founded; three academy courses, classical (three years), literary (two), and English (four)—the first of these preparatory for college. For fifteen years the same classical preparation has been required for entering the college classical or the college philosophical course.

The first freshman class entered in 1850, six young men, and graduated two in 1854, at Davenport. The first freshman at Grinnell, ten years later, numbered twelve, and graduated three in 1865, with ten young ladies in the three years' "ladies' course." The whole number of students at Davenport in 1851 was 76; at Grinnell in 1861, 99; in 1882, the year of the tornado, 355; of these 160 in the college course, 29 graduating; in 1885, 379; of these 141 in the college course, 21 graduating. Nearly 4000 students in all have been taught since the foundation. A musical conservatory was added in 1873, and a professor appointed in 1875. So large a proportion of students seek music that last year 109 were enrolled in the conservatory. A beginning has been made of manual training in connection with the scientific course.

The college has had 48 trustees, the full number at any one time by incorporation being 21. It has had but one President, Rev. George F. Magoun, D. D., elected in 1862, serving over 20 years, and still retaining the chair of metaphysics which he has always filled; 6 professors of ancient languages; 2 of mental and moral science; 3 of mathematics; 4 of chemistry; 2 of rhetoric; 1 each of natural history, applied mathematics, didactics, and political science; 9 academy principals and 5 lady principals. Instruction in modern languages attached to the Greek and Latin chairs, now distinct; and, in history, to the chair of political science. Six of its graduates have occupied chairs in other institutions, and 22 have been assistant instructors in the college itself. The graduates reach about 280.

From the first the religious character of the college was decided, but not sectarian. This was not changed when the Presbyterian founders withdrew. At Davenport and at Grinnell there has been a strong and healthy religious influence within the institution. Twenty-six of the graduates of the classical college course have entered the ministry. The college began with 13 town-lots and $1362 in money, at Davenport, and notwithstanding its heavy losses at Davenport and at Grinnell its property compares with that of other institutions in the interior of the same age. It has fifteen instructors. It is fortunately located as to central position in the State, healthiness, and moral influences in the town. Of late years three of the trustees have been chosen by the alumni, one each year, and two nominated by the State Congregational Association. (G. F. M.)

IOWA STATE UNIVERSITY. The State of Iowa in 1846 received from the Federal government 46,080 acres of land, to be selected by State authority from any unsold lands, and used as the State might see fit, for the support of a university.

In 1847 the legislature located the university at Iowa City, the public buildings there being granted for its use, while branch institutions were recognized at other places in the State. It was not until 1855, however, that the university was opened, and the State constitution of 1857 restricted the university to one place without branches. Amos Dean, LL.D., of Albany, N. Y., was the first president and chancellor. In December, 1857, when the old capitol was vacated by the State authorities, it became the seat of the university, an appropriation having been made for the necessary changes. The funds proved insufficient for the maintenance of the institution and work was for a time suspended. In September, 1860, however, the university was reorganized under the presidency of Silas Totten, D. D., LL.D., formerly president of Trinity College, Hartford. Six departments of instruction were provided, and 172 students admitted. In 1862 Prof. O. M. Spencer succeeded to the presidency, and in 1863 the collegiate department graduated its first class. Pres. Spencer made a visit to Europe in 1865 and then, wishing to prolong his stay there, resigned in 1867. He was succeeded by Rev. James Black, D. D., who served until 1870, when Rev. George Thacher, D. D., succeeded and held the position until 1877. After a year's interval Josiah L. Pickard, LL. D., was chosen president, and he is still at the head of the institution.

The university now comprises the following departments: collegiate, including classical, scientific, and engineering courses; law (begun in 1868); medical (1870); homœopathic medical (1877); dental (1883); and pharmaceutical (1885). The full course in the collegiate department occupies four years, and students must be at least seventeen years of age. Each county is entitled to two students at a time, and all Iowa soldiers or soldiers' orphans are admitted free. Other students are charged $25 a year for tuition. Several schools and colleges through the State are allowed to present certificates of standing for applicants, which supersede examination wholly or partially.

The permanent fund of the university is about $213,000. The income from the land fund is about $16,000 per year, and the special endowment adds to this the sum of $28,000 per year. The only sure income, independent of tuitions, is $44,000 per year. Since the admission of the State the average expenditure has been little more than $28,000 a year; but since the full organization of the several departments it has been a little more than $54,000 a year.

A recently published catalogue of alumni shows the whole number of graduates, 2327; attorneys, 882 (including 13 judges); physicians, 405 (9 professors); clergymen, 43; journalists, 25; civil engineers, 10; State and U. S. officers, 9.

IREDELL, James (1750–1799), an American jurist, was born at Lewes, England, Oct. 5, 1750. He emigrated to North Carolina in 1767, studied law with Gov. Samuel Johnston, and was admitted to the bar in 1770. He was collector at Port Roanoke, now Edinton, for some years, was made attorney-general in 1774, and was chosen judge of the Supreme Court in 1777, but soon resigned. He was a member of the State Constitutional Convention in 1778, and State attorney-general from 1779 to 1782. He was judge of the U. S. Supreme Court from February, 1790, till his death, which occurred at Edenton, N. C., Oct. 20, 1799. His judicial opinion in the case of Chisholm *vs.* Georgia has been cited in support of the doctrine of State rights. His *Life and Correspondence* were published by G. J. McKee (1857).

IREDELL, James (1788–1853), an American jurist and senator, son of the preceding, was born at Edenton, N. C., Nov. 2, 1788. He graduated at Princeton College in 1806, studied law, was elected to the State legislature, and was its speaker for two years. He became judge of the Supreme Court of North Carolina in 1819, and governor in 1827, and was U. S. Senator, 1828–31. Afterwards, for many years, he was reporter of the decisions of the State Supreme Court. He published 13 volumes of law and 8 of equity reports. In 1833 he was appointed one of the commissioners to collect and revise the statutes of North Carolina. He died at Edenton, N. C., April 13, 1853.

IRELAND. The history of this unfortunate country since 1881 has been one of continuous decline in wealth, industry, and population, with a parallel increase in popular discontent and social disturbance. The only outlook for a better future is the prospect that the legislative union with Great Britain, which was consummated in 1801, is likely to be determinated, and Ireland is to be allowed again to have that self-government under which her people were advancing to prosperity at the close of last century.

See Vol. XIII. p. 220 Am. ed. (p. 214 Edin. ed.).

The report of the registrar-general at the beginning of 1885 showed the population to be about 4,962,000 souls, a loss of 3,137,853 since 1841, and probably of 3,352,451 since the beginning of the famine in 1846. As the island contains 20,157,511 acres of land, it has only 156 persons to the square mile; it falls much below the European average of density, and can be called "over-populated" only in a very technical sense.

The industrial statistics of the island are as discouraging as those of population The one great industry is agriculture. With every year the area under tillage diminishes. Twice since 1881—in the winter of 1882–83 and in that of 1885–86—there have been severe local famines, although the island produces food far in excess of the need of its people. The crops of 1882 were generally inferior, but five of the principal food crops produced more than 7 pounds, weight of food a day for every man, woman, and child on the island. Besides this there were exported in that year to England 200,000 neat-cattle, 100,000 swine, and 250,000 casks of butter.

To relieve the supposed excess of population the government in that and subsequent years had recourse to compulsory and assisted emigration. The Irish Poor Law differs from the English in that the board of guardians are forbidden to extend outdoor relief to able-bodied persons even in time of sudden and great distress. To a request for a relaxation of the law the government refused to accede, avowing its purpose to effect a cure by emigration from the distressed districts. As a consequence in a number of cases persons died of absolute want rather than incur the social disgrace which in Ireland attaches to entering "the house." In other cases emigration was accepted as a hard necessity, and the impoverished people were assisted with a pittance to seek a home in the new world. Such of them as came to America were very properly excluded under the law which forbids the ingress of the dependent classes. It is notable that in 1884 distress was greatest and the poor rates highest in the "unions" which were relieved of "congestion" in this way.

The Land Law of 1881, by which Mr. Gladstone undertook to solve the problem of Irish misery and discontent, has not proved to be the true solution. It entered upon its work under unhappy auspices. Mr. Charles S. Parnell and his associates in the Irish Land League advised the tenant farmers to refrain from applying to the new land courts until the worth of the law should be ascertained by test cases. For this they were arrested and confined in Kilmainham jail, and thereupon (Oct. 18) the League proclaimed a strike against rent. To suppress this strike and to keep order in the country proved a task beyond the powers of the Liberal ministry. After a detention of five months Mr. Parnell and his friends were released (May, 1882) upon an understanding that they would not oppose applications to the land courts, and that they would help in restoring order to their distracted country. The irritation which their arrest and the suppression of the Land League had caused had borne its natural fruit in secret conspiracies. One of these—the Invincibles, with head-quarters in London—caused the assassination of Lord Cavendish, the newly appointed secretary for Ireland, and Mr. Burk, the under secretary, in Phœnix Park, on May 6. Mr. W. A. Forster was the victim intended. He had escaped a short time previously through having his children in his carriage, and then finally by resigning the secretaryship for Ireland and leaving the country.

The actual working of the Land Act as administered by the courts was somewhat disappointing to the popular expectations even in Ulster, where Mr. Parnell's advice went for little. Under the terms of the act the land experts were left a margin for judgment as to the real owners of many unexhausted improvements, and tenants claimed that they most commonly decided for the landlord and unjustly. Very large reductions from the actual rents—reductions reaching in some cases as high as 30 or even 50 per cent.—were ordered by the courts, and the rents thus fixed for fifteen years. But even in the five years which have elapsed the price of agricultural produce of all kinds has fallen so heavily, under the stress of competition from India and America, that these legal rents have already become excessively burdensome, and a new strike against rent is talked of.

It also was found that the law of 1881 was unavailable for a large class of tenants, who had fallen greatly behind in paying the rents in the bad years which preceded the passage of the law. To relieve them Mr. Gladstone carried the "Arrears of Rent (Ireland) Act" through the House of Commons in July and August, 1882, but abandoned it on its rejection by the House of Lords. That a measure of such importance should have been surrendered so easily was taken by the Irish as a fresh proof of the inequality of their position in the united kingdom. In October the National League was organized, being substantially a revival of the Land League under a new name.

The fundamental defect of Mr. Gladstone's legislation was that it made no provision for the most serious of the economic evils which affect Ireland, the one which is a principal root of even her agrarian difficulty. It did nothing to re-establish in Ireland those other industries which perished after the union, and whose absence compels the Irish peasant to accept land on any terms he can get it. It did nothing for the great host of the landless and the laborless—900,000 in the "proclaimed districts" alone in 1883, according to an English authority—who had no outlook for employment in Ireland and no means to escape out of it.

The popular instinct has fastened upon this want in the demand for the revival of Irish manufactures. At present nearly every article which the people use except food has to be bought by the export of food, and the rents of the non-resident landlords have to be paid in the same way. The country has abundance of cheap labor, of water-power, of wool and iron, even a sufficiency of coal. She has dormant capital in plenty for the inception of such industries. But the extinction of the habit of manufacture in the people, the control of the markets by English manufacturers, the long credits given by them to Irish shopkeepers, and similar hindrances are in the way. To overcome these, in the absence of power to enact protective legislation, the people have had recourse to voluntary associations pledged to use Irish manufactures only. In this way something has been done for the woollen industry, especially in Cork; but such arrangements work very imperfectly and fitfully in the absence of a national legislature to give effect—as in 1782—to the people's judgment of what is best for their interests. And the demand for the restoration of self-government has connected itself with the demand of power to do this. Without losing sight of the land question the leaders of the Irish people have laid more stress upon this industrial question for the last five years than previously. And the industrial exhibitions held in Dublin and in Cork have served at once to emphasize the poverty of the country in this respect and its resolve to rise out of the level of industrial uniformity.

The changes recently effected in the political methods of the United Kingdom have done much to give Ireland the opportunity to express her wishes freely. In 1869 household suffrage was established in the English and Scotch boroughs, but not in the county constituencies and not in any Irish constituency. In 1884 Mr. Gladstone carried a law assimilating the suffrage in every part of the United Kingdom to that established for the boroughs in 1869. There was some resistance to this as regards Ireland, and even a proposal to reduce the Irish representation in the House of Commons below the 103 members specified in the Treaty of Union. But Mr. Gladstone resisted both demands. As a consequence of this removal of the restrictions laid on the suffrage the Home Rule party elected 84 of the 103 members in 1885, securing even a majority of the representatives for Ulster, utterly effacing the Irish Whigs, and leaving the Tories only a strip along the coast from Londonderry to a short distance below Belfast. This almost unanimous plebiscitum of the Irish people against the legislative union with Great Britain at once put a new face upon the Irish question. It was not merely or chiefly the increased power to obstruct the course of imperial legislation by methods whose use by a much smaller number in the previous Parliament had forced a revolution in parliamentary procedure, but the declaration of the great body of the Irish people that they regarded the union as an intolerable yoke, which neither they nor their fathers were able to bear. Even before the new Parliament met it was understood that Mr. Gladstone, having failed to secure a Liberal majority great enough to outvote both Conservatives and Home Rulers, was considering the propriety of granting what would satisfy the Irish demand, and was ready to take office by the aid of the Home Rule party. By the union of the two parties on an English agrarian issue Lord Salisbury's Conservative ministry was driven from power without being given the chance to dissolve

Parliament and appeal to the country to maintain "the unity of the Empire." Mr. Gladstone returned to office, with Mr. John Morley as chief secretary for Ireland, under pledges to abstain from coercive legislation, and to go as far in satisfying the wishes of the Irish people as is consistent with "the rights of the Crown and the integrity of the Empire."

This result could not but prove most displeasing to the minority of the loyalists, who represent the English and Scotch colonies in Ireland. But even Ulster is no longer under the control of this element, and beyond guarantees for religious liberty it is not possible for the English government to take cognizance of less than a fifth part of the nation. The landlord element is equally disaffected to the change, and Mr. Gladstone and Mr. Morley propose the extinction of their rights by purchase as a preliminary to granting Home Rule. Mr. Parnell thinks the question may be left with safety to the new Irish Parliament, as likely to be more conservative than that of Great Britain now is.

(R. E. T.)

IRON. There is no evidence that the aboriginal inhabitants of either North or South America had any knowledge of the manufacture or use of iron. The first recorded discovery of iron ore within the limits of the United States was made in North Carolina in 1585, and the first attempt to manufacture iron dates from 1619, in Virginia, when iron works were "set up;" but before they had made any iron they were destroyed by the Indians in 1622.

See Vol. III. p. 284 Am. ed. (p. 278 Edin. ed.).

In 1643 the first successful iron enterprise in the colonies was undertaken at Lynn, in the colony of Massachusetts Bay. It embraced a blast-furnace and foundry for producing castings and "sowe iron" and a forge for refining the "sowe iron" into "barr iron." The furnace was in operation in May, 1645, and the forge was in operation in September, 1648. From the time of the establishment of these works the colonial iron industry made steady although slow progress. The furnaces supplied pots, kettles, andirons, stoves, clock weights, and similar articles which are now produced by foundries, while the forges supplied wrought-iron for horseshoes, wagon tires, harrow teeth, and some of the nails that were needed. Some of the forges refined the "sowe iron," or pig-iron, of the furnaces, but the most of them made bar-iron and other forms of wrought-iron directly from the ore. All wrought-iron was hammered into shape under tilt-hammers and trip-hammers. Bog ore was generally used in New England in colonial days, but in the other colonies rock ores were chiefly used. In 1717 the colonies began to export to Great Britain small quantities of bar-iron, and in 1728 the exportation of pig-iron also commenced. Shipments of bar-iron and pig-iron to the mother country were continued almost yearly down to the Revolution. The exports in no one year exceeded 2500 tons of bar-iron, nor greatly exceeded 6000 tons of pig-iron. For a hundred years after its settlement in 1620 Massachusetts was the chief seat of the iron industry in the colonies; but about the middle of the eighteenth century Pennsylvania became the leading iron-producing colony, and this distinction it has ever since maintained. The iron manufactures, however, were the foundation of the industrial prominence of Massachusetts.

At the beginning of the Revolution, Georgia was the only colony that did not at this time produce iron. After the Revolution the manufacture of iron in the United States was extended from the Atlantic coast into the interior, but the aggregate production of the country did not greatly increase for many years. The first industrial statistics of the country published is *A Statement of the Arts and Manufactures of the United States of America*, as they existed in 1810, prepared by Tench Coxe, under the authority of the secretary of the treasury. From this the following table, showing the condition of our iron industry in 1810, is compiled.

In the totals for the United States the values are believed to be correct, as they include returns from every State, but some of the quantities given are not strictly accurate. The figures for Pennsylvania are included in the figures for the country at large. The tons used are net tons of 2000 pounds.

Establishments and products.	United States.	Pennsylvania.
Blast-furnaces	153	44
Air-furnaces		6
Tons of cast-iron made	60,377	30,103
Value of cast-iron made	$2,981,277	$1,301,343
Bloomaries	135	4
Tons of iron made	2,872	
Value of iron made	$226,034	$16,000
Forges	330	78
Tons of bar-iron, etc., made	27,486	12,285
Value of bar-iron, etc., made	$2,874,063	$1,156,405
Trip-hammers	316	50
Product of trip-hammers in tons	672	
Value of product of trip-hammers	$327,898	$73,496
Rolling and slitting mills	34	18
Tons of rolled-iron made	10,394	5,042
Product of slit-iron in tons		110
Value of rolled and slit-iron	$1,215,946	$606,426
Naileries	410	175
Pounds of nails made	15,727,914	7,270,825
Value of nails made	$2,478,139	$760,862

The growth of American iron and steel industries from 1810 to 1880 is shown by a comparison of the above table with the census statistics of production of each leading branch in the census years 1870 and 1880, as follows, in net tons of 2000 pounds:

Iron and steel products.	1870.	1880.
	Net tons.	Net tons.
Pig-iron and castings from furnaces	2,052,821	3,781,021
All products of iron rolling-mills	1,441,829	2,353,248
Bessemer steel finished products	19,403	889,896
Open-hearth steel finished products	....	93,143
Crucible steel finished products	28,069	70,319
Blister and other steel	2,285	4,956
Product of forges and bloomaries	110,808	72,557
Total	3,655,215	7,265,140

The progress made in all branches of iron metallurgy has been more marked in the last ten years than perhaps ever before, and a retrospect for a decade shows wonderful changes which have followed each other so rapidly that it is difficult to even summarize them.

The number of persons directly employed in 1880 in the production of iron and steel in this country was 140,978.

Iron Ores exist in workable quantities in most of the States and Territories of the United States, and, with a few exceptions, are exploited in all the well-settled sections. The character of the ores embraces all the general compositions and formations. The Dominion of Canada also has extensive deposits of iron ores, and in the Republic of Mexico and some South American states this important factor in material development is not wanting. Without detailing the occurrence of ores in each particular locality the following is a summary of the more important deposits of America:

Magnetic ore sand is obtained from the shores of the Pacific Ocean, on the California coast; from those of Long Island Sound and of the St. Lawrence River on the Atlantic border. These are utilized in a small way in the bloomary forge fires or in so-called direct processes.

Magnetic ores are mined in the provinces of Ottawa and Quebec, Canada; in the Adirondack Mountain region of New York; in Northern Central New Jersey; in Eastern Pennsylvania; in what is known as the Lake Superior district; in Western North Carolina, etc. The most important single deposit of magnetic iron ore on the continent now exploited is the Cornwall ore hills, Pennsylvania, which have been wrought since 1740, having produced, up to 1886, over 7,300,000 gross tons of ore, and with an available supply, determined by measurement, variously estimated at from 40,000,000 to 60,000,000 tons. This has been and will continue for years to be worked above the general level and by open cut; of the large bodies of ore it is the cheapest to mine in this country. The output of this deposit for the year 1884 was 412,320 gross tons. The magnetic ore mines of the Adirondack region and those of New Jersey have each produced an aggregate of over 500,000 tons per annum.

The highest possible percentage of iron in ore is in pure anhydrous *magnetic oxide of iron*, the *proto-sesquioxide of iron*, or *Ferroso-ferric oxide* $Fe_3 O_4$, which contains 72.413 per cent. of iron, and in some mines in Northern New York and in the Lake Superior district ore very close to this composition has been obtained in limited quantities.

Specular or *red hematite* or *fossil hematite* ores are obtained from Canada, Northern and Central New York, Central Pennsylvania, Western Virginia, Alabama, Tennessee, Missouri, and the Lake Superior district, and also from some of the Western States and Territories. The Iron Mountain and Pilot Knob, in South-eastern Missouri, are the best known single deposits, they having produced since their opening 3,000,000 and 1,000,000 gross tons, respectively. A notable deposit of specular iron ore—which, from appearance, is believed to be the largest individual mass of iron ore on the continent, if not in the world—is a mountain close to the city of Durango, Mexico, known as the Cerro de Mercado. The general character of this ore is a metamorphic magnetite, known as martite. An American company has erected a blast-furnace at this immense deposit. Other specular ores abound in Mexico, Ontario, and Quebec, Canada, and in Cuba.

Brown hematites or *limonites* are very generously distributed, particularly east of the Allegheny Mountains and in the Mississippi Valley, and form the basis of the iron industries in the Salisbury region of Massachusetts and Connecticut, the East Penn and Cumberland Valleys of Pennsylvania and Maryland, the Shenandoah and New River Valleys of Virginia, etc. They also abound in Maine, North Carolina, Georgia, Alabama, Kentucky, Central Tennessee, Wisconsin, Louisiana, Texas, and in the Western States and Territories. The most important mining region of the continent is known as the "Lake Superior district," embracing the upper peninsula of Michigan, North-eastern Wisconsin, and Northern Minnesota. The total ore production (magnetites and hematites) from this region have been nearly 30,000,000 gross tons, and in one year as much as 3,000,000 tons have been taken from the ground. The largest output from an individual mine was in 1882, when 296,509 gross tons were taken from the underground workings of the "Lake Superior" mine; several other mines have, however, raised from 200,000 to 250,000 gross tons in a year. The mining of this region, as a rule, is done underground, but there are some very extensive hematite open workings of considerable depth.

The basis of the hematites is *ferric oxide* or *peroxide of iron*, or *sesquioxide of iron* $Fe_2 O_3$, composed of 70 per cent. iron and 30 per cent. oxygen, and no specular or red hematite ore contains more than 70 per cent. of iron, even when anhydrous. Admixture of silica, alumina, lime, magnesia, etc., reduce these percentages. This oxide when hydrated is the basis of brown hematites.

Carbonate or *spathic* ores are mined in Eastern New York, Western Pennsylvania, Maryland, Eastern and Southern Ohio, Western Kentucky, etc.; there are also deposits of "black-band" ores. The carbonates, as a class, are unreliable under heavy cover.

Ferrous oxide or *protoxide of iron* (FeO), composed of 77.78 per cent. of iron and 22.22 per cent. of oxygen, never occurs free in nature; but, combined with carbonic acid and mixed with earthy and carbonaceous matter, it is the basis of carbonate ores. In this state, $Fe CO_3$—Ferrous carbonate, or carbonate of iron—it contains 48.275 per cent. of iron, which represents the highest percentage of iron in its pure anhydrous state, a condition never found in ores of the carbonate class.

The earlier iron industry depended largely on bog ores, which are abundant but lean; in later years the use of bog ores has been abandoned in the United States, although in the province of Quebec, Canada, this class of ore has continued to be the main support of its limited iron-producing capacity.

Magnetic Iron Ores, or Magnetites.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Protoxide of iron	19.639	78.278	15.171	26.230	89.04	80.76	85.59	82.371
Sesquioxide of iron	67.761		42.193	59.750				.878
Bisulphide of iron	....	5.222	2.604	....	....	....	....	.711
Oxide of manganese	.130	trace.	.139	.280	trace.	trace.	0.24	
Oxide of cobalt	....	.200	.080					
Oxide of copper	....	1.840	none.					
Copper pyrites	....	.352	none.					
Alumina	2.130	....	3.102	1.520	0.38	3.11	0.11	5.175
Lime	.680	1.000	9.200	.300	1.15	1.59	0.72	1.582
Magnesia	.690	1.286	5.333	.120	1.06	1.02	0.33	.998
Sulphuric acid	....	.039	.900	....	trace.			
Sulphur	.132	....	....	.030	....	0.28		
Phosphoric acid	.199	.072	.043	.080	trace.	trace.	....	.803
Carbonic acid	....	....	.428	....	1.97	....	....	1.045
Water	.811	.629	1.050	....	....	....	1.53	
Silica	7.828	11.082	19.640	11.600	6.34	13.25	11.48	6.925
	100.000	100.000	99.883	99.910	99.94	100.01	100.000	100.488
Metallic iron	62.930	59.229	42.550	62.230	64.43	58.20	61.98	60.66
Phosphorus	.085	.032	.019	.035	trace.	....	trace.	.3524
Sulphur	.132	2.910	1.750	.030	trace.	....		.379

(1) Lake Superior magnetic and slate ores; average from Champion, Edwards, Michigan, Spurr, and Washington mines.
(2) Cornwall ore, Lebanon co., Pa.
(3) Dillsburg magnetite, York co., Pa.
(4) Crown Point, New York.
(5) Bethlehem mine, Ottawa, Canada.
(6) Chateaugay mines, New York.
(7) Cranberry, North Carolina.
(8) Hibernia, New Jersey.

Red Hematite (Specular) Iron Ores.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sesquioxide of iron	93.750	90.520	91.450	90.870	72.571	89.04	77.571	69.51	77.071
Protoxide of iron	....	....	2.340	1.670	....	7.92	2.071		
Sesquioxide of manganese	trace.	trace.	none.	none.	.320	....	.113	0.07	trace.
Alumina	.730	1.390	.930	.530	4.723	.32	1.124	1.27	3.350
Lime	.610	.700	.450	1.760	.174	.56	5.050	3.24	.840
Magnesia	.230	.420	.190	.130	.309	.40	.364	.96	
Sulphur	.030	.050	none.	.078	....	.04	....		
Sulphuric acid	....	....	....	....	trace.	....	.212		
Phosphoric acid	.320	.258	.252	.069	.256	.21	3.041	.50	.510
Water	1.090	.770	....	....	3.440	....	1.984	1.20	2.75
Siliceous matter	3.270	5.892	4.710	5.570	18.650	1.77	7.760	20.89	13.19
	100.030	100.000	100.322	100.677	100.443	100.26	99.29	97.64	97.711
Metallic iron	65.620	63.364	65.780	64.910	50.800	68.49	55.80	48.66	53.95
Phosphorus	.140	.110	.112	.031	.112	.093	1.328	.22	.223

(1) Jackson mine, Lake Superior.
(2) Lake Superior specular ores; average from the Barnum, Cleveland, Jackson, Lake Superior, New York, Republic, and Kloman mines.
(3) Iron Mountain, Missouri.
(4) Pilot Knob, Missouri. (Hard ore.)
(5) Clinton Fossil ore, Huntingdon co., Pa.
(6) Haycock mine, Ottawa, Canada.
(7) Cerro de Mercado, Durango, Mexico (average of 27 samples).
(8) Old Sterling, Sterlingsburg, New York.
(9) Eureka mine, Oxmoor, Alabama.

Brown Hematites, or Hydrated Oxides of Iron.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sesquioxide of iron	76.428	65.87	72.143	73.51	64.016	84.58	80.01	70.07	73.5	60.212	78.86
Sesquioxide of manganese	1.456	....	1.273	0.96	2.490	....	.169	4.507	....	3.891	1.490
Sesquioxide of cobalt	.066	....	.011	....	....	....	....	....	....	.130	
Alumina	1.260	1.87	2.457	....	1.692	.53	4.29	....	1.3	4.296	2.37
Lime	.230	.50	.170	4.41	1.170	....	....	....	1.	.500	.58
Magnesia	.147	....	.457	....	.445	.01	.59	....	1.2	.627	trace.
Sulphuric acid	.008	....	.135	0.14	....	....	.29	.102	3.00	.085	.35
Phosphoric acid	.602	.485	.103	0.57	1.278	.35	.33	.40	.08	1.124	.37
Water	12.733	12.915	11.276	10.00	18.985	11.74	5.13	10.306	16.5	11.622	9.25
Siliceous matter	7.290	17.36	11.970	10.48	12.920	3.23	5.09	10.770	4.2	19.260	7.06
	100.220	99.000	99.995	100.07	102.996	100.44	95.89	96.155	100.78	100.262	100.33
Metallic iron	53.500	46.11	50.500	51.45	46.137	59.20	56.01	49.05	51.45	40.60	55.202
Phosphorus	.263	.194	.045	0.25	.548	.16	.145	.179	.033	.491	.160

(1) Chestnut Hill, Lancaster co., Pa.
(2) La Grange Furnace, Tennessee.
(3) Bloomfield Bank, Blair co., Pa.
(4) Old Hill, Salisbury, Connecticut.
(5) Oswego, Oregon.
(6) Cherokee, Cedartown, Georgia.
(7) Ironton, Sauk co., Wisconsin.
(8) Noble Furnace, Wythe co., Virginia.
(9) Katahdin Furnace, Maine (roasted).
(10) Pine Grove Furnace, Pennsylvania.
(11) Shelby Iron Works, Alabama.

Carbonate (Spathic) Ores.

	(1)	(2)	(3)	(4)	(5)
Protoxide of iron	44.742	65.394	52.56	64.27	63.03
Sesquioxide of iron	.818	....	....	....	2.85
Bisulphide of iron	.272				
Oxide of manganese	1.059	2.740	2.35	1.90	3.90
Alumina	2.795	7.204	....	1.47	2.19
Lime	3.119	....	7.00	.61	6.80
Magnesia	3.870	....	....	.45	7.13
Potash					
Sulphuric acid	trace.	trace.	.484	....	4.47
Phosphoric acid	.096	.397	.705	.295	.102
Carbonic acid	34.450	....	21.000	24.87	
Water	1.090	....	4.000	....	.55
Carbonaceous matter	.640	....	.950	....	
Siliceous matter	7.450	20.460	5.000	5.93	9.20
	100.401	96.195	94.049	99.795	100.222
Metallic iron	35.500	45.776	40.88	46.06	46.18
Phosphorus	.042	.173	.232	.13	.0445

(1) Carbonate ore of the Coal Measures, Fayette co., Pa.
(2) Baltimore, Maryland (roasted).
(3) Hanging Rock Region, Ohio (raw).
(4) Wassaic, New York (raw).
(5) Hudson River Ore Company, New York (roasted).

The foregoing tables exhibit typical analyses of prominent American iron ores, selected to represent the general features of districts rather than the product of individual mines. As far as practicable the run of the mine has been indicated, as there are great variations in the composition of each deposit. *Iron pyrites*, bisulphide of iron, $FE\,S_2$, is not included, as it is not used for smelting iron to any extent.

Iron ores are at present mined and utilized on a limited scale in Colorado, New Mexico, California, Oregon, and Washington Territory.

The consumption of domestic iron ores in the United States was given by the American Iron and Steel Association as 7,718,129 gross tons in 1884. This embraced probably 500,000 tons of mill cinder.

The average consumption of ore per ton of pig-iron produced in the blast-furnaces of the United States is 2.03 gross tons.

The ores mined range through all grades of hardness, and include all sizes from great masses to fine sand. One peculiar deposit in Wisconsin is known as "flaxseed" ore, from its recognized similarity in appearance to that grain.

In addition to the domestic supplies of ore, large quantities of foreign ores are imported into the United States, the quantities being as follows:

Year.	Gross tons.	Year.	Gross tons.
1879	284,141	1883	490,875
1880	493,408	1884	487,820
1881	782,887	1885	390,786
1882	589,655		

The countries supplying most of this ore were Spain, Italy, Algeria, and Canada. Cuba is also developing a considerable ore trade, and efforts are being made to ship ores from South America to the United States. A duty of 75 cents per ton is now placed on foreign iron ores, which encourages the importation only of those containing high percentages of iron or carrying small amounts of deleterious ingredients.

A large proportion of the cinder from puddling or heating furnaces, forge fires, etc., is also charged into blast-furnaces convenient to rolling-mills or bloomaries, and a small amount of pyrites residuum, after the sulphur is extracted for acid manufacture, is also utilized.

TREATMENT OF ORES.—Most of the ores mined in America are smelted in blast-furnaces, but a small proportion of magnetite is converted directly into blooms, principally in Northern New York, and another proportion is employed in fettling puddling and heating furnaces.

Roasting of ores is not as generally employed as would appear advisable, being confined chiefly to carbonates and some sulphurous magnetites. Occasionally brown hematites are roasted to drive off water or break up lumps, and separate clay, etc.

Roasting kilns are employed for magnetites, but carbonates and limonites are mostly calcined in open ricks or heaps.

With but few exceptions these kilns are modifications of the Gjers's type illustrated in the ENCYCLOPÆDIA BRITANNICA. These exceptions are structures using blast-furnace or producer gas as fuel, improvements upon and modifications of the Westman gas kiln used in Sweden, a crude type of which appears in the ENCYCLOPÆDIA BRITANNICA. In the ricks or Gjers's kilns, small or waste fuel, anthracite culm, bituminous slack, charcoal braize, or old wood are used. For sulphurous ores, the gas kilns are most satisfactory.

In winning brown hematites, which are generally taken from large, open workings, the close admixture of the ore with clay, etc., renders some means of treatment necessary to enrich the ore as mined by the removal of foreign material. This treatment generally consists of reducing the lumps by heat or by crushing, washing the clay, sand, etc., from the ore, and picking out the stones.

As a rule the mechanisms to affect these results are crude and imperfect in their action, but improvements introduced have developed methods which produce ores yielding a larger percentage of the iron with less waste and labor than has been the custom. The fine ore sand is generally wasted as tailings, but in some instances this is utilized for iron smelting or fettling.

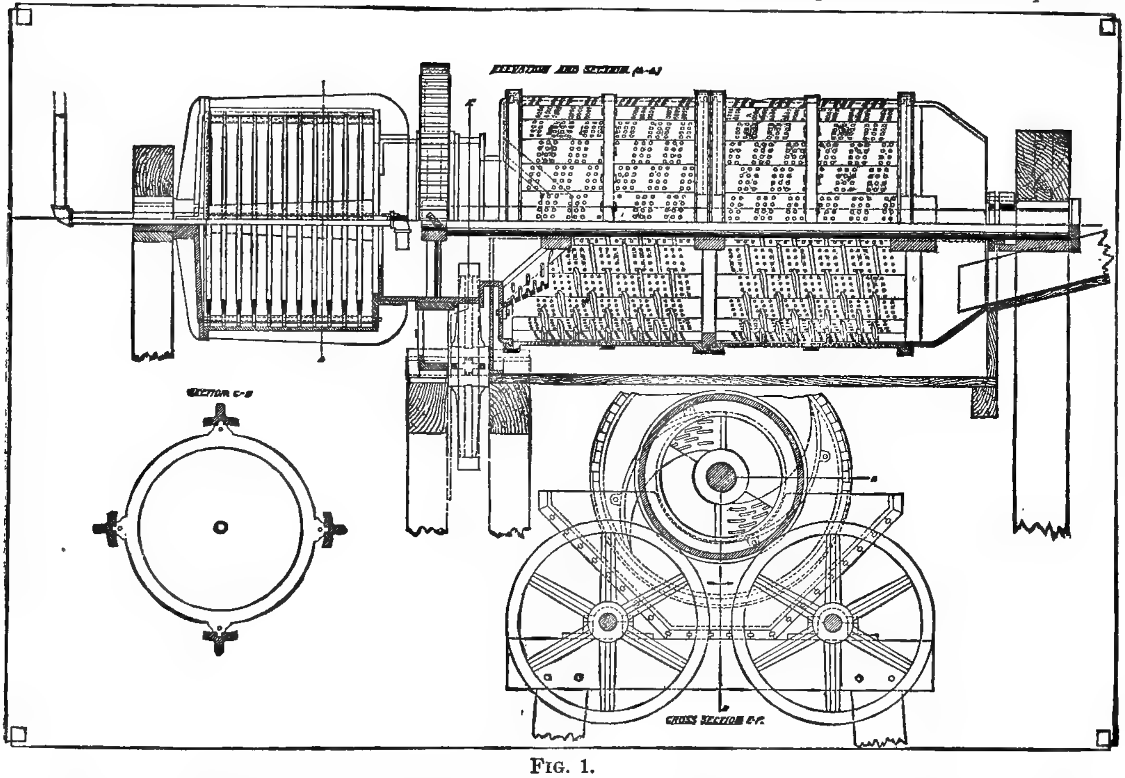


FIG. 1.

A form of washer largely used for removing the clay from brown hematite ores and separating the sand from the ore is exhibited by Fig. 1. The ore enters with water from the right by the chute into a revolving iron cylinder, formed of a series of perforated staves secured by bands; paddles or cutters on the inside of the staves break up clay lumps. The cylinder revolves in a wooden tank containing water, and fresh water also enters from the other end to rinse the ore before it passes into the separator, which is a series of rings held at such distances apart as the nature of the ore requires, so as to separate the coarse and finer particles. The figure shows the washer in part section and part plan in upper portion, and in transverse section in lower portion. Other washers consist of revolving wooden shafts with iron paddles.

Blast-Furnaces.—A typical blast-furnace, in 1835, was a stone stack 30 feet square at the base, 20 feet square at the top, and 30 feet or less in height, pierced by one working or forepart arch in the front, and one or two tuyere arches on the sides. The forepart arch was fitted with a tymp stone, and a forehearth extended out to a dam stone. A high breast, or overshot water-wheel operating wooden blowing tubs, furnished the blast, which was carried through wooden or tin pipes and delivered cold through open clay tuyeres, under a pressure of ½ pound to 1 pound per square inch. The thickness of the hearth walls was seldom less than 3 feet, and the crucible enclosed by these walls was ordinarily from 5 to 7 feet in height and square in section, the bottom being from 24 to 27 inches square. The boshes sloped about 40 degrees from the vertical, or 10 inches horizontal to 12 inches vertical, to the greatest diameter at top of bosh (generally 8 to 9 feet); the top or throat of the furnace measured from 2½ to 3 feet in diameter, and over this an iron plate, with a hole 20 to 24 inches in diameter, was placed.

The fuel used (exclusively charcoal) was charged into the tunnel-head by baskets; the ore and flux were fed by boxes. The output was about 3 or 4 tons daily; at the commencement of a "blast" the product was small, but as the campaign progressed it became augmented, owing to the enlargement of the crucible and steepening of the bosh due to the stones being cut back by the intense heat at the zone of fusion.

The location selected for the blast-furnace was generally on the bank of a stream which furnished the water-power, and close to ground sufficiently elevated to permit of constructing a bridge house from the top of the furnace stack to the general level, on which were placed the coal houses, ore supply, etc.

The product of the furnace was carried in wagons to distant localities, the castings being disposed of in cities and towns, or the pig-iron worked into blooms or anchovies at forges. Often a forge was operated in connection with the furnace. Each furnace maintained a general store, and most of the pay due the wood choppers, charcoal-burners, ore-miners, teamsters, furnacemen, etc., was expected to be expended at the store.

The ores used were chiefly brown hematites, easily smelted, and they were mixed with a small percentage of lime to flux impurities and make cinder, which flowed continually over the dam-stone; one side of the casting house being devoted to pig-iron and the other side to cinder.

While many features of plant or practice as described have been abandoned, there are still instances where most of the above-mentioned appliances or methods are in use, and individual plants can be cited for which this description would be practically a record of present arrangement and management. Such instances are, however, becoming less frequent each year.

Some stone blast-furnace stacks are still active which are more than a century old. The Cornwall charcoal furnace in Lebanon co., Pa., has been an active iron-producing establishment since 1742, and ranks as the oldest plant in operation in the United States.

As the country was developed, the demand for iron necessitated more furnaces or larger outputs from existing plants, and as the capacity of a charcoal plant was dependent upon the timber available, the reduction of fuel per ton of iron claimed attention. This was attained in part by more careful selection and preparing of ores, by heating the blast, and by improved methods of carbonizing wood.

The plants have been constantly improved, and Fig. 3 represents the "Irondale" charcoal furnace erected in 1886, within 4 miles of the Lakeville furnace (Fig. 2), to use the same ores which supplied the older plant.

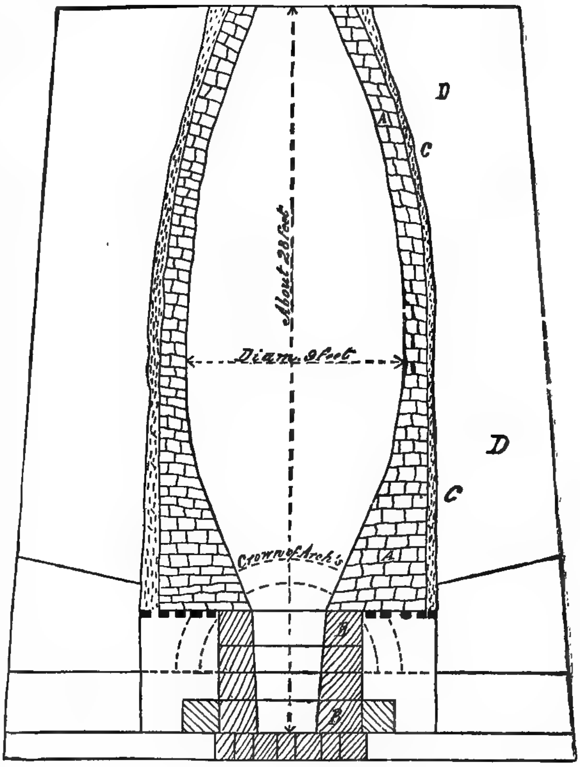


FIG. 2.

Fig. 2 represents the oldest American furnace of which the records of shape were preserved. The lining, *A A*, of the furnace was slate; the crucible and bosh, *B B*, "fire-stone" from the Hudson River; the backing, *C C*, yellow clay used for grouting; and the masonry of the stack, *D D*, was white limestone. The furnace was located at Lakeville, Conn.

As a further illustration of the older methods, the form of the blowing machinery used in 1776 is shown by Fig. 4, which represents side and end elevations. *A A* were old-fashioned leather bellows, there being two of them, driven by a water-wheel, *B B*, the shaft of which was provided with tappets, *C C*, which engaged with a lug, *D*, attached to the levers, *D F F*, by which the bellows were operated.

In this connection the form of blowing engine employed at the Irondale furnace, New York, above mentioned, is shown by Fig. 10. This type, which is in more general use at American blast-furnaces than any other, will be referred to under blowing machinery.

About the time that hot-blast was coming into favor the employment of mineral fuel was investigated, and soon anthracite coal and bituminous coal were competing with charcoal as a blast-furnace fuel. The first experiments with mineral fuel were conducted in furnaces arranged to use charcoal, and the results demonstrated that to obtain satisfactory operation changes in the plant were necessary. Anthracite fuel, or coke, can be, and has been, used in furnaces arranged for charcoal, and several instances of this are on record. In 1879 the problem was satisfactorily tested at Pine Grove furnace, Pennsylvania, where, without going out of blast, the furnace was run first on charcoal, then on coke, then on mixed coke and anthracite coal in varying proportions, then on all anthracite coal, then on coke, and back again on charcoal. The furnace being 9′ 4″ by 44′ was too small to obtain the best results, but it averaged a larger output on lower fuel consumption per ton of iron, and with less air per pound of fuel when fed with charcoal than when using other fuels, and a mixture of coke improved the operation of the plant when anthracite coal was used.

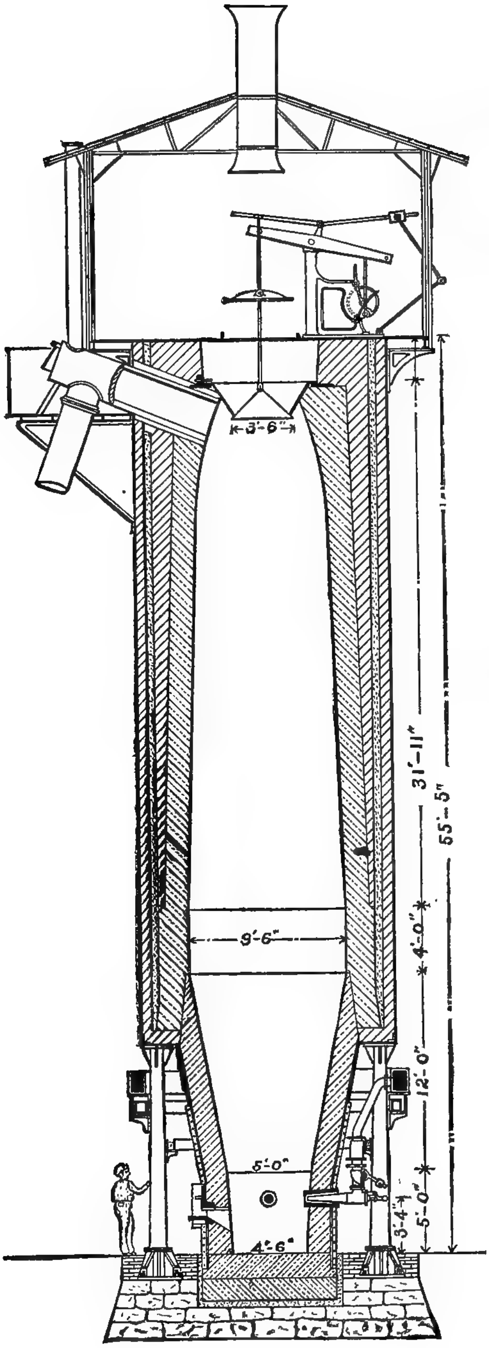


FIG. 3.

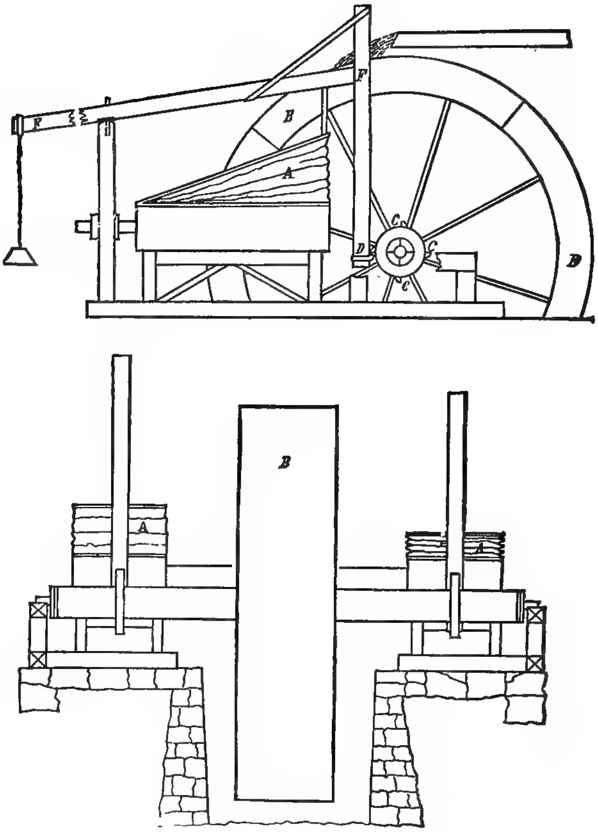


FIG. 4.

The details of these experiments are given on the opposite page.

The tons are 2260 pounds each for pig-iron, 2240 pounds for everything else.

It should be noted that these experiments were limited by the fuel available during labor disturbances.

The successful employment of mineral fuel in blast-furnaces may be considered as having been satisfactorily accomplished commercially in 1840. The result of the change necessitated many alterations in plants to secure the best results, not only in an increase of power for blowing machinery, but in size of furnace, the diameter of the boshes, the dimensions of tuyeres used, and many details of construction which were modified from year to year. The accessibility of large quantities of coal permitted of increasing the size of furnaces beyond what was deemed advisable for those using charcoal.

The enlargement was not rapid up to the year 1873, when blast-furnaces 17 feet in diameter at the bosh and 60 feet high were considered large, and a product of over 60 tons of pig-iron a day was unusual. At present American blast-furnaces have been constructed 21 feet in diameter at bosh and 86 feet high, and furnaces 20′ by 75′ have produced over 300 tons of pig-iron per day.

The increased output is not due alone to the dimensions of the furnace, but is owing to a combination of causes, among which may be mentioned steep boshes, large crucibles, increased volume, pressure, and temperature of blast, the careful selection and thorough preparation of the stock, and the study of the chemical reactions in the blast-furnace.

The number of furnaces using the various fuels, as given in the directory to the iron and steel works of the United States, by the secretary of the American Iron and Steel Association, on Dec. 31, 1885, is as follows: Charcoal, 181; coke, 202; anthracite, 208; total furnaces, 591.

Technical investigation of the merits of various fuels have not been as thorough as the subject demands; and comparatively little has been done in the study of anthracite coal in its adaptability as a blast-furnace fuel. Coke has received more attention, and several valuable papers have been prepared upon this topic. It is only lately, however, that the relative merits of different fuels for iron manufacture have been thoroughly investigated, the most recent experiments being those of Dr. Thoerner, of Germany, who compared large samples of a series of cokes and charcoals, and the results of his investigations are epitomized in the following comparison of coke and charcoal as blast-furnace fuels:

Summary of Results of Smelting Brown Hematite Iron Ore with Various Fuels at Pine Grove Furnace.

Items from record of working.	Fuel used.					
	Charcoal, February, 1879.	All coke, March 22 to April 2, 1879.	Anthracite, 81.5 per cent.; coke, 18.5 per cent., April, 1879.	All anthracite, April and May, 1879.	Anthracite, 55 per cent.; coke, 45 per cent., May, 1879.	Charcoal, August, 1879.
Pounds of fuel consumed per ton of pig-iron	2,531	3,494	3,473	3,871	3,271	2,650
Pounds of ore and flux carried per pound of fuel	2.8	2.32	2.47	2.14	2.34	2.64
Tons of iron made per week, average	95	70	78	58	77	101.6
Percentage of iron yielded in furnace	38.26	40	38.40	38	43.3	40
Percentage of lime to ore burned	22	44	50	47.4	50	24.4
Average cubic feet of blast per minute	1,896	2,435	2,749	2,434	2,473	2,301
Average cubic feet of air per ton of iron.	197,084	323,845	338,187	398,679	317,170	216,243
Average cubic feet of air per pound of fuel.	77.8	92.66	96.13	103	97	81
Average pressure of blast in pounds	.77	1	4.25	4.75	2.5	1.25
Tuyere area in square inches	47.7	28.9	14.7	14.7	14.7	42.5
Least time that stock was in furnace, hours	12.5	20.5	22	31	25	9.5
Grade of iron	2.4	3	2.7	3	3	2
Duration of experiments, days	28	10	10	23	19	31

Thoerner's Experiments with Blast-Furnace Fuels.

Fuels.	Ash, per cent.	Density.		Cell space in 100 grams.		Percentages of loss.			
		Apparent.	Actual.	Cell space, c. cm.	Volume of fuel, c. cm.	Volume under pressure.	Hydrocarbons. (Weight.)	Carbonic acid. (Weight.)	By action of air. (Weight.)
Gas coke, Pluto	3.8	1.825	0.858	61.6	54.8	54.7	....	10.6	46.8
Gas coke, Fr. der Gr	7.5	1.811	0.868	60.0	55.2	51.5	0.25	11.8	45.0
Pressed coke, Cöln-Müsen	7.7	1.852	0.984	47.6	54.0	47.6	1.40	13.6	51.0
Pressed coke, Cöln-Müsen	6.9	1.786	0.969	47.2	56.0	51.9	1.15	8.4	48.9
Coppée coke, Cöln-Müsen	7.99	1.880	0.926	54.8	53.2	48.6	1.13	8.7	50.1
Carlsglueck	7.8	1.825	0.909	55.2	54.8	47.5	1.55	8.3	54.4
Maassener Tiefbau	7.3	1.852	0.890	58.4	54.0	50.9	1.70	8.0	51.5
Westhausen	10.6	1.852	0.919	54.8	54.0	48.5	1.70	9.5	52.9
Neu Iserlohn	8.8	1.852	0.874	60.4	54.0	52.4	....	12.2	46.8
Dannenbaum	8.45	1.894	0.890	59.6	52.8	51.9	0.75	6.8	57.1
Germania-huette	7.6	1.909	0.903	58.4	52.4	53.4	....	8.9	52.1
Heinrichs-huette	7.6	1.887	0.980	49.0	53.0	46.7	....	6.9	52.5
Meiler coke	2.9	1.448	1.046	28.4	67.2	43.1	29.70	45.6	87.7
Charcoal, fir	2.9	1.626	0.382	200.4	61.6	72.7	17.90	97.8	100.0
Charcoal, oak	2.45	1.347	0.587	96.2	74.2	58.7	13.20	92.0	78.6
Charcoal, beech	2.10	1.481	0.594	100.8	67.6	57.8	11.80	98.0	80.3
Charcoal, birch	1.65	1.351	0.484	132.5	74.0	60.0	13.20	98.4	100.0
Piesberg anthracite	9.3	1.666	1.572	3.6	60.0				
Borgloh coal	8.3	1.323	1.300	1.4	75.6	....	....	....	74.4

The actual density given in the table is the density of the carbon. The loss of volume was determined by crushing and screening to a uniform size, and then subjecting the materials to equal pressures to show their relative capacities of carrying burdens in the furnace. The loss of hydrocarbons confined in cell spaces was determined by maintaining previously dried samples at a white heat in a current of hydrogen for thirty minutes. The percentages of loss in weight in carbonic acid indicate that in submitting samples for one-half hour to a current of carbonic acid the carbon in charcoal is more readily attacked than that of coke. The percentage of loss by action of a current of air upon the heated fuels for ten minutes is shown by the last column.

The bituminous furnaces average larger dimensions than those using anthracite, and the anthracite plants are of greater size than those which depend on charcoal. Comparing the number of blast-furnaces in the directories of July, 1882, and September, 1884, with their average nominal capacity, the following statement is presented to show how rapidly advances are being made:

Average.		1882.	1884.
Capacity per charcoal furnace	net tons...	4,500	5,496
Capacity per anthracite furnace	" "	12,277	14,366
Capacity per bituminous coal furnace	" "	19,550	21,945
Capacity per blast-furnace in the United States	" "	11,679	13,798

In statistics the net ton of 2000 pounds is used for uniformity, but in the manufacture and sale of iron the gross ton of 2240 pounds is employed, and in pig-iron an allowance for sand of 20 to 40 pounds additional is made. Blooms are sometimes sold by the ton of 2464 pounds, being an allowance of 10 per cent. for waste.

This progress is still better shown by comparing the average annual output per furnace in 1873 and 1885 :

Furnaces	In blast Dec. 31, 1873.	Average Output 1873.	In blast Dec. 31, 1885.	Average Output 1885.	Average Output 1885 over 1873.
		net tons.		net tons.	net tons.
Charcoal	190	3,040	60	6,664	3,624
Anthracite	137	9,582	105	13,851	4,269
Bituminous coal	83	11,782	111	24,105	12,323
Total	410	6,996	276	16,413	9,507

The output of an old-style cold-blast charcoal furnace, 9 feet in diameter at bosh and 28 feet high, was from 4 to 6 tons of pig-iron per day, the consumption of charcoal being from 150 to 225 bushels per ton. The Mont Alto furnace, Pennsylvania, with bosh diameter of 9½ feet and height of 44 feet, averaged 25½ tons of cold-blast iron, on a consumption of 129 bushels of charcoal per ton of iron made.

When hot-blast was employed the older furnaces of the above dimensions increased their product to from 8 to 10 tons per day; but improved appliances and management have latterly obtained 30 to 40 tons per day from similar ores in furnaces of practically the same diameter of bosh, but with larger crucibles and greater height, and the fuel consumption has fallen to 100 bushels per ton or less.

In larger and more modern plants of 11 feet diameter at bosh and 60 feet high, using rich ores, a product of 70 tons per day and a fuel consumption of less than 85 bushels of charcoal per ton has been attained.

Anthracite or bituminous furnaces were not operated cold-blast in America, but a comparison of results obtained from plants twenty years ago with those of the same size to-day shows that the output has practically doubled under more intelligent management; and furnaces 16 feet diameter and 55 feet high, which formerly made 30 tons of iron per day, now produce from 60 to 100 tons. Technical knowledge and the application of new improvements have done even more for bituminous furnaces, for in these the employment of coke with superheated blast, and the establishment of new plants, have given them advantages not possessed by others. Bituminous furnaces which ten years ago became prominent because they made 80 tons per day have now reached an output of over 200 tons per day.

Raw bituminous coal has been and is used in some districts, but it is much inferior as a furnace fuel to coke, and there is also a great difference in the merit of coke from various localities for this especial purpose.

The best results obtained with anthracite fuel have been where comparatively small sizes of coal are used. The practice of charging very large lumps having been generally abandoned, coal of the size commercially known as "steamboat" has been substituted.

A modern blast-furnace structure may be described as a wrought-iron shell or casing, resting upon a wrought-iron mantle sustained by wrought- or cast-iron columns of such height as to expose as much of the bosh as possible to the cooling action of the atmosphere.

The interior shape of the furnace approximates two frusta of cones placed base to base at the bosh, the two lesser diameters fixing the size of the bottom and the stock line; the variations are mainly in cylindrical portions for the crucible or prolongation of the bosh, in greater or less slope to the bosh and inwalls, and in the relative sizes of the greater and lesser diameters of the two ends of the frusta. The tunnel head is fitted with cup and cone, or bell and hopper, operated by a lever, and the charging opening is covered by a seal plate. Gas is withdrawn just below the hopper and conveyed in masonry flues to the "downcomer."

The furnaces are of various dimensions, from the smallest, which has a diameter at the bosh of 6 feet and a height of 17 feet, to the largest, which has a bosh diameter of 20 feet and a height of 86 feet; the maximum, minimum, and average dimensions being as follows:

Furnaces.	Height.			Diameter at Bosh.		
	Max.	Min.	Av.	Max.	Min.	Av.
Charcoal	65′ 0″	17′ 0″	39′ 7″	14′ 0 ″	6′ 0″	9′ 6″
Bituminous	86′ 0″	28′ 0″	66′ 0″	21′ 0 ″	8′ 6″	14′ 11″
Anthracite	80′ 0″	20′ 0″	55′ 8″	20′ 6 ″	7′ 0″	14′ 10″

The shapes adopted also vary greatly, but the structure shown in Fig. 3 is typical. Figs. 5, 6, and 7 show the outlines respectively of charcoal, anthracite, and bituminous furnaces drawn to scale.

Fig. 5.—*A* shows the shape of a Connecticut furnace

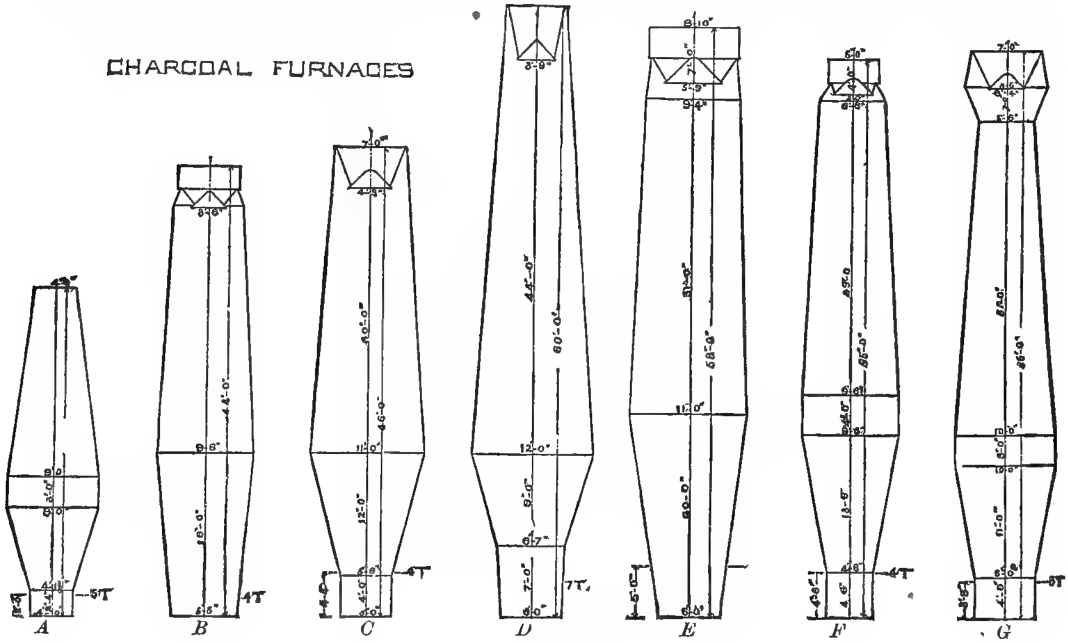


FIG. 5.

ANTHRACITE FURNACES

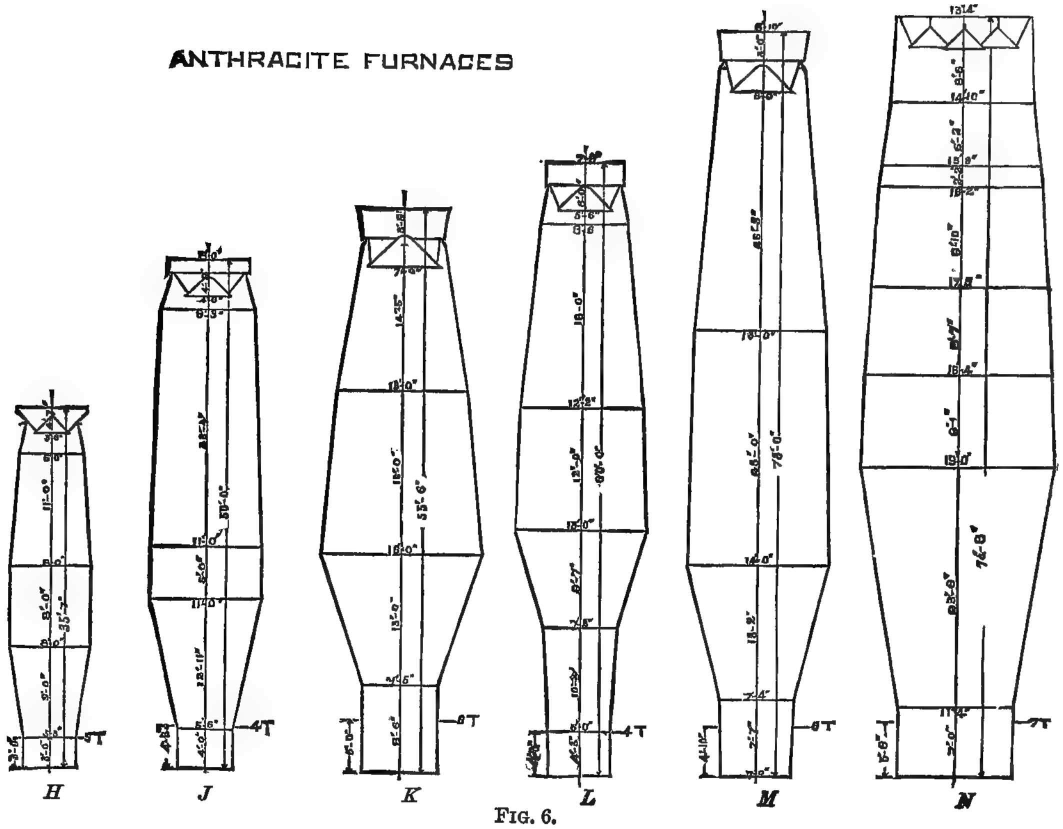


FIG. 6.

COKE FURNACES

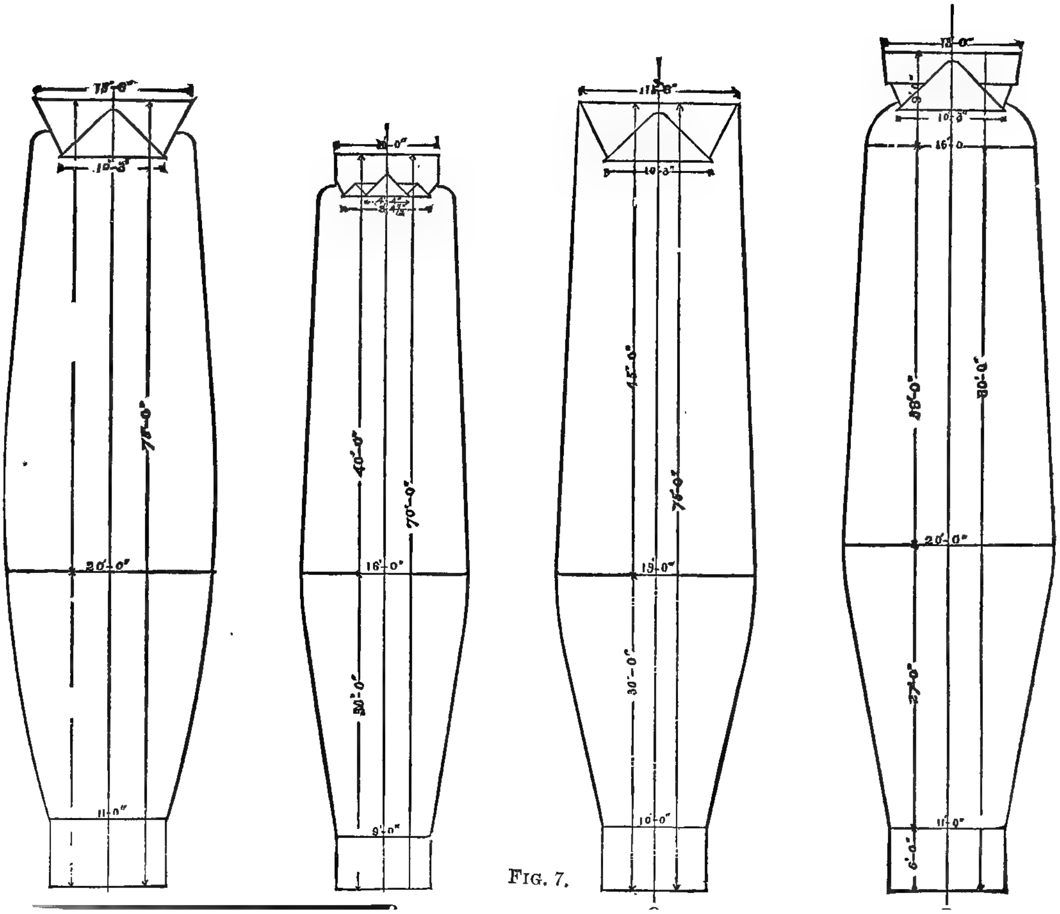


FIG. 7.

producing 100 tons of car-wheel iron per week, from 45 per cent. brown hematite ores, with the consumption of about 100 bushels of charcoal, and with blast heated to about 600 degrees delivered through five tuyeres.

B, a Pennsylvania furnace using 40 per cent. brown hematites, which has produced 150 tons car-wheel iron per week, with the consumption of 130 bushels of charcoal, with cold-blast; and 180 tons of forge-iron per week, with the consumption of 103 bushels of charcoal, blast heated to 800 degrees. It has four tuyeres.

C, a Michigan furnace which produced an average of 345 tons Bessemer iron per week from soft red hematite ores, yielding 60 per cent. of iron, the blast being heated to 750 degrees, 90 bushels of charcoal being consumed per ton of iron. It has four tuyeres.

D, an Alabama furnace which during a continuous campaign of more than seven years averaged over 17 tons of foundry iron per day, with the consumption of 115 bushels of charcoal per ton, blast heated to 750 degrees. Since remodelling to the shape shown it averages 40 tons of iron per day, consuming 100 bushels per ton, using brown hematites, yielding 45 per cent. It has seven tuyeres.

E, a Missouri furnace averaging 240 tons of Bessemer iron per week, from 50 per cent. soft specular ores, consuming 98 bushels of charcoal per ton, blast temperature 650 degrees. It has five tuyeres.

F, a new furnace in Texas to smelt limonite ores.

G, a Michigan furnace using 60 per cent. specular ores, producing 200 tons of car-wheel iron per week, with blast at 750 degrees, and a consumption of 115 bushels of charcoal per ton. It has three tuyeres.

Fig. 6.—*H*, a New Jersey furnace producing 70 tons per week of 15 to 20 per cent. spiegel from franklinite residuum carrying about 30 per cent. of iron, and consuming $2\frac{1}{4}$ tons of anthracite coal per ton of iron, with blast heated to 950 degrees. It has five tuyeres.

J, a Pennsylvania furnace of moderate dimensions erected to use 40 per cent. brown hematite ores with anthracite coal or coke. It has four tuyeres.

K, a Pennsylvania furnace which in a continuous campaign of nearly five years produced an average of 414 tons of foundry and mill iron from a 50 per cent. mixture of magnetic and brown hematite ores, the temperature of the blast being 870 degrees, and the consumption of fuel ($\frac{1}{4}$ coke and $\frac{3}{4}$ anthracite) 1.3 tons. It has six tuyeres. During the campaign its best week's work was $615\frac{1}{2}$ tons, on a consumption of 0.95 of a ton of fuel, the blast temperature being 840 degrees and the yield of ore 53 per cent.

L, a New Jersey furnace using anthracite coal mixed with $\frac{1}{10}$ to $\frac{1}{12}$ coke, and smelting 48 per cent. hard magnetic ores, which produced 235 tons per week, with blast heated to 760 degrees. It has four tuyeres.

M, a Pennsylvania furnace of which no records are accessible, built for anthracite coal, has six tuyeres.

N, a Pennsylvania furnace smelting New Jersey magnetites and a small percentage of hematites, the mixture yielding 53 per cent., which in a continuous campaign of three years averaged 600 tons of iron per week, with a consumption of 1.23 tons of fuel (anthracite with 12 to 18 per cent. of coke). During the campaign the best week's output was 701 tons, with a fuel consumption of 1.05 tons. It has seven tuyeres.

Fig. 7.—*O* is one of a pair of Western Pennsylvania coke furnaces making mill iron of Lake Superior (62 per cent.) ores and mill cinder. In a continuous campaign of three years this stack produced an average of 1050 tons of iron weekly, and has made over 5400 tons per month. The blast is heated to 1200° to 1400° Fahr. Three furnaces in Illinois of same proportions and similarly equipped made the following record with all Lake Superior ores (62 per cent.) during the last half of 1885. The tons of iron made in each of the three furnaces, and the pounds of coke consumed per ton of iron made each month, are shown :

Month.	No. 1.		No. 2.		No. 3.		Total for month.	
	Iron.	Coke.	Iron.	Coke.	Iron.	Coke.	Iron.	Coke.
July.........	5,559	2,127	5,532	2,105	6,075	2,012	17,166	2,078
August.....	5,467	1,967	5,510	1,994	5,978	1,875	16,955	1,947
September.	5,735	1,981	5,863	1,968	6,488	1,897	18,106	1,947
October.....	5,478	1,954	5,827	1,948	5,989	1,941	17,294	1,947
November.	5,796	1,954	6,126	1,966	6,242	1,877	18,164	1,932
December..	5,752	1,912	5,987	1,911	5,926	1,892	17,665	1,905
Total......	33,787	1,982	34,865	1,982	36,698	1,912	105,350	1,959

P. A Virginia furnace producing from a mixture of 50 per cent. hematite ores smelted with coke about 550 tons of foundry iron per week, using blast at 1200° to 1400° Fahr. It has seven tuyeres.

Q. A furnace in Central Pennsylvania which in a continuous campaign of three and a half years has produced an average of 950 tons of Bessemer iron per week from an ore mixture yielding 48.5 per cent. of iron, the consumption of coke averaging 2460 lbs. per ton of iron. It has six tuyeres and uses superheated blast.

R is one of a pair of new coke furnaces constructed in Eastern Tennessee to use the fossil hematites and coke from local coal. No record has yet been made. It has eight tuyeres and uses superheated blast.

Although the furnaces are numerous, their scattered locations and necessities of trade do not permit of all being active at one time. Between the years 1873 and 1885 there has been no time when over 63.7 per cent. of all the blast-furnaces in the country have been reported as in blast; and the proportion of active furnaces has been as low as 30 per cent. of the whole.

The largest percentage of active furnaces returned was 82.1, as shown by the record of anthracite furnaces in April, 1880. The aggregate reported nominal capacity of all the blast-furnaces in the United States is about 9,000,000 net tons.

The usual arrangement for closing the top of a blast-furnace consists of a conical bell of cast- or wrought-iron closing against a hopper of the same material. Among the modifications in form are a double bell or an annular ring fitting against a fixed bell and the hopper. Methods of sealing the top, to prevent the gases escaping when the bell is lowered, have also been applied.

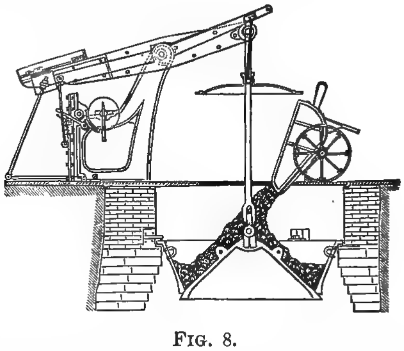


Fig. 8.

Fig. 8 illustrates a bell with sunken hopper, a double beam being employed to control the motion of the bell and also that of the seal cover. Several arrangements of bell and hopper are shown in Figs. 5, 6, and 7, and forms of operating them, or arrangements for withdrawing gases, are illustrated in the Encyclopædia Britannica.

Thin walls of fire-brick, 12″ to 27″ thick, protected by water-cooled appliances, take the place of thick stone masonry, and large tuyeres are employed. Volume rather than pressure of blast is recognized as the gauge for determining the proper operation of the plant.

Gas is brought from the top of the furnace by wrought-iron pipes or "downcomers," either to overhead iron or underground masonry flues, which connect with burners at the hot ovens and boilers, and the results of combustion are carried to high-draft stacks or chimneys, generally constructed of wrought-iron and lined with fire-brick.

Hot-Blast Stoves.—Duplicate iron-pipe stoves or regenerative fire-brick stoves are employed for heating the blast, but few furnaces have an excess of either form. Ordinarily two iron-pipe or three regenerative stoves are connected to a furnace. The pipes conveying the heated air are either lined inside or protected on the outside with non-conducting materials, and tuyere fixtures are, as far as is practicable, similarly treated.

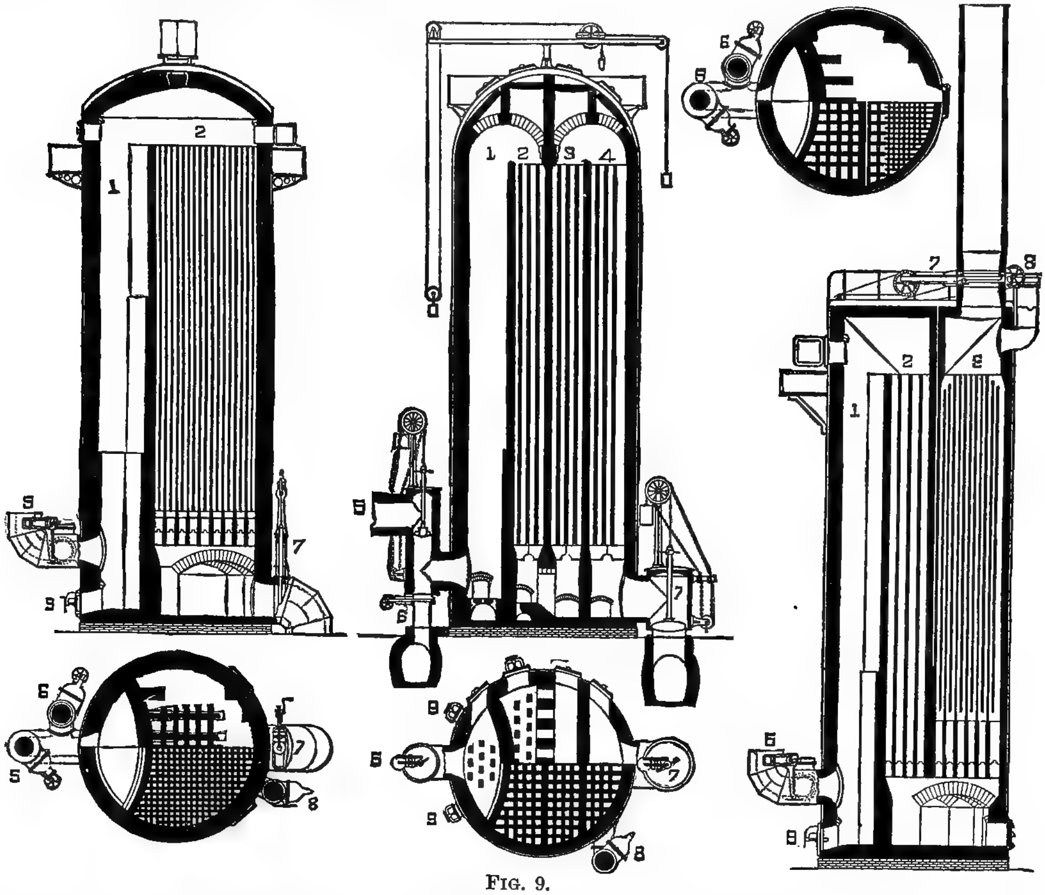


FIG. 9.

The types of regenerative or fire-brick hot-blast stoves used in American blast-furnaces are shown on Fig. 9. The gases from the furnace are burned in combustion chambers 1, the resulting product passing through a series of vertical parallel walls, or a checker work of fire-brick 2, 3, 4. After these masses of masonry are sufficiently heated the gas is shut off and the blast, passing through the various openings in a reverse direction, abstracts the heat, and the air entering the furnace can thus be raised to a temperature of from 1400° to 1600° F. The cold air valves in each case are marked 8, the hot air valves 5, the gas valves 6, and the air regulators 9.

The iron-pipe hot-blast stoves are of various designs and proportions, a majority consisting of series of double-legged pipes, of circular or elliptical section, united at the top, thus, ∩, and standing in rows upon sockets, cast on bed-pipes of rectangular section. The blast enters by appropriate connections and passes through the ∩ pipes, uniting two mains or different sections of one main. Where the span of the pipes is considerable they are sometimes called "ox-bow pipes." Where the pipes connect sections of the same main single pipes divided by diaphragms are employed, and one form from its curved and enlarged end is recognized as "pistol" pipe. Another form is a single vertical pipe enclosing a smaller pipe, the cold air passing up through the interior pipe and down between it and the outside pipe; the object of these modifications being to expose as thin films of air as possible to the heat of the burning furnace gases; for, in any case, the air requires but a few seconds to pass through a hot-blast stove. A modification consists of small mains, each uniting one leg of two pipes instead of a large main with openings for the legs for several pipes. Hot-blast stoves with ∩ pipes and pistol pipes are illustrated in the ENCYCLOPÆDIA BRITANNICA.

An arrangement growing in favor is the suspended-pipe stove, in which the U pipes are hung from above and connected to horizontal mains.

In all iron-pipe stoves the gases are ignited in combustion chambers, either below or at one end of the pipe chambers to which they enter through suitable openings. The safe limit for heating blast in iron-pipe stoves is from 900° to 1100° F., according to construction and arrangement, the high temperature having a tendency to cause the pipes to bend or warp. More pipes are, however, injured by sudden changes of temperature than by high heats, and where stoves are used alternately, that is, kept in use for a limited time, and then allowed to cool for cleaning, the pipes have been found to increase in length as much as 13 per cent. The lengths of cast-iron hot-blast pipe vary from 9 to 16 feet—12 to 14 feet being most in favor.

Blast Machinery.—The variety of form and arrangement of blowing machinery in use at iron works is very great. The older type, of which a small number continue in use, consist of wooden blowing tubs cylindrical or rectangular in form, from 5 to 7 feet in diameter, or square, and from 2 to 5 feet stroke, lined with apple or other hard wood. Wooden pistons with leather edging are fitted in the tubs and connected with square wooden piston rods working in square stuffing boxes. The blowing tubs, when single acting, had the outlet valves in the piston, and, when double acting, these valves were in the ends of the tubs.

Experiments demonstrated that mineral fuel required more powerful blowing machinery than that given by water wheels and wooden blast tubs, and except where there were unusual water facilities steam-power was soon employed and, generally, horizontal iron blowing tubs were placed in connection with steam-engines.

The horizontal cylinders soon gave way to others placed vertically and connected directly with the steam-cylinders in various ways. A steam-cylinder has been placed between two vertical air-cylinders, or a single air-cylinder has been placed below the steam-cylinder; but the prominent type of blowing engine now in use is an air-cylinder supported on housings or columns above the steam-cylinder, with a cross-head between the two, and fly-wheels outside of the steam-cylinder, connected by rods with the extremities of the cross-head.

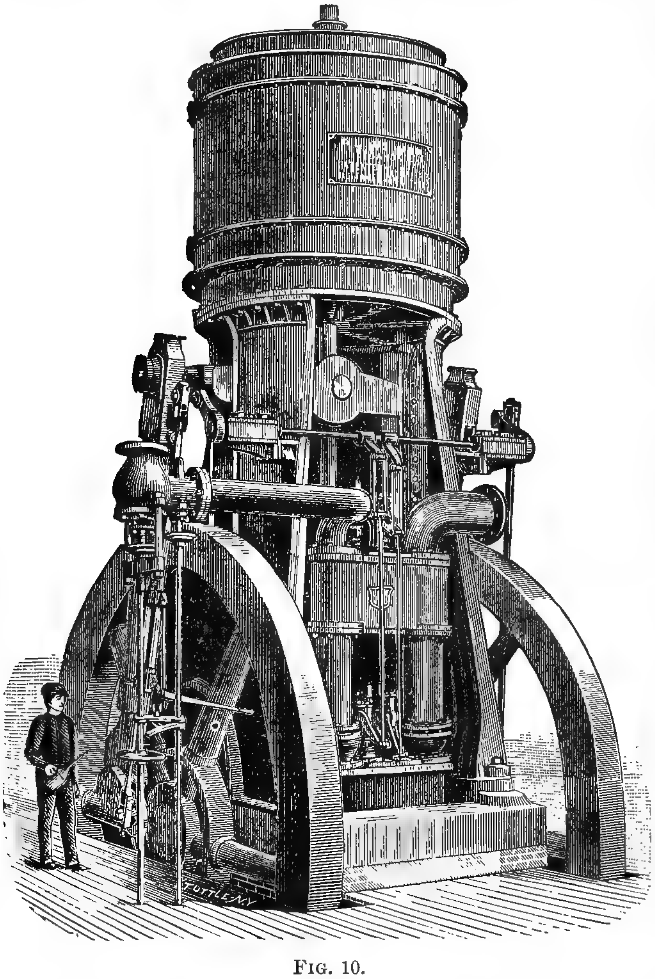


FIG. 10.

Fig. 10 illustrates an engine of this type.

In isolated cases beam condensing engines have been used and large expenditures have been made for them. With but few exceptions the blowing engines now in use are non-condensing. In late years the direction of improvements has been towards increasing the speed and thus getting large capacity from small engines. This has mainly been accomplished by the arrangement of air-cylinder valves. A combination of one or two horizontal steam-cylinders operating by crank shafts two vertical air-cylinders is also in very extensive and satisfactory use.

Much time and investigation have been devoted to the manufacture of blowing engines, and they are among the more prominent types of American machinery. Some of the engines constructed for blast-furnaces are very massive, and blowing cylinders 9 feet in diameter and 9 feet stroke are connected with some plants; but the prevailing sizes of blast cylinders are 4 to 7 feet in diameter and 3 to 7 feet stroke. The increased speed of operation is at present having the tendency to reduce the length of stroke, and 4 feet represents that now generally preferred for the larger furnaces.

Boilers.—The type of boilers connected with American blast-furnaces has generally been long cylindrical or double-return flue boilers, in some cases the length being 80 feet. Tubular boilers have also been used, the objection to them being the difficulty of cleaning, and lately water-tube boilers with cleaning appliances have been adopted at several blast-furnaces.

The blast originally delivered to the blast-furnace through a single tuyere was divided and the number of tuyeres increased; few furnaces use less than 3 for small furnaces or more than 8 for large stacks. They vary in diameter from 2 to 7 inches.

Tuyeres.—The intensity of blast necessitated the abandonment of open tuyeres, and iron forms were used. These were also so rapidly destroyed that water-cooling became necessary, and this was accomplished by making the tuyeres of an inner and an outer shell, the water circulating in the annular space; or coils of pipe were used, either bare or encased with iron which was cast about them. Later modifications of these have sprays injected into the annular space, or the shells are formed of bronze, or the coils are wound about grooved castings, or about wrought-iron forms. They are also set in "water-breast" castings, which fit around the tuyeres and through which water circulates.

The stock or pipe leading to the tuyere is made with universal joints, and where regenerative hot-blast stoves are used the pipes are often lined with refractory material.

Figure 11 illustrates an iron- or bronze-box tuyere, set in a water-cooled tuyere breast, and connected by a belly-pipe to a tuyere stock. The tuyere and tuyere breast are formed of metal cones enclosing an annular space through which water circulates; the blast enters the tuyere stock and passes thence through the belly-pipe and tuyere to the furnace hearth; the eyesight permits of viewing the action of the furnace, and, by removing the cap, bars can be inserted for removing cinder, etc.

Fig. 12 (page 479).—*A* shows a plain coil tuyere uncovered; *B*, the same surrounded by cast-iron; *C*, a cast-iron grooved shell, split longitudinally for expansion, about which iron pipe is coiled, and through which the water for cooling passes.

Fig. 13 (page 479) exhibits a bronze tuyere set in a suitable breast, with trough to form a cinder notch for a closed front furnace. By removing the tuyere a larger opening is secured.

Handling Stock.—The prevailing custom is to enclose all parts of the furnace. No case of continuous casting in the open air as is done in England is known of in America, and in a majority of cases the raw material is also kept under cover, generally in a large building through which a series of railway tracks are supported on trestles. The stock entering by suitable cars with drop bottoms is delivered into bins, from which it is shovelled into charging buggies or barrows and conveyed to the elevator. In some plants the bins are enclosed and fitted with doors so that the stock drops into the buggies without the use of a shovel or fork.

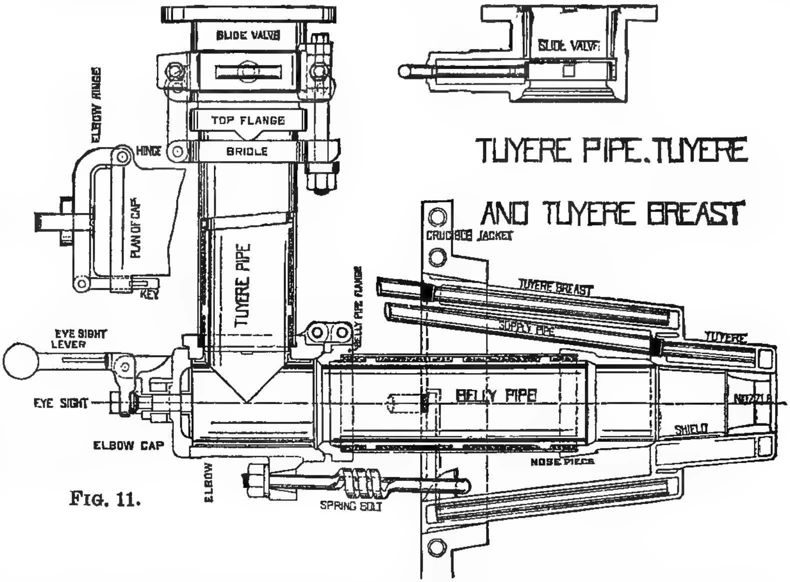


Fig. 11.

Inclined planes for hoisting the stock for the furnace are not generally employed, but vertical hoists are used, the power being steam, air, or water. The steam-hoists may be divided into those which transmit power from steam-engines to winding drums, and those in which the piston, moving within a long vertical cylinder, turns by means of a rack and pinion a large wheel or drum over which the ropes sustaining the cages pass. Pneumatic hoists are operated by means of compressed air acting upon a piston in a long cylinder generally the height of the furnace. The water-balanced hoist is practically the only method employed which may be classed as hydraulic. This consists of boxes beneath the platform of the hoisting cages, which are filled with water at the top of the furnace until the weight is sufficient to raise the loaded barrows on the opposite cage. Safety catches which engage in racks, or which force chisel blades into the wooden framing of the hoist in case of accident to the hoisting rope, are attached to many cages, and supplementary ropes are used as additional safeguards. The structures or towers in which the hoisting carriages (of which there are generally two) are placed are either constructed of brick, wood, or iron; as these towers must extend sufficiently above the top of the furnace to allow room for the cages and operating drums, they are often quite imposing structures.

A late revival of a practice which has been in use to a limited extent is to carry the stock from the floor of the stock-house up to and over the tunnel-head, where it is dumped automatically, thus dispensing with manual labor at the top of the furnace. The plan most approved is to fill the charge into a receptacle of suitable size in the shod-shed, and raise the whole charge to the tunnel-head at once. These receptacles are provided with bells and hoppers in the bottom to distribute the stock.

Stacks and Fixtures.—Old stone stacks, when used, were either topped out with a circular shaft of brick masonry bound with iron or by casings of wrought-iron enclosing the inwalls. Brick piers supporting a brick shaft banded with iron are also used, but the prevailing type of a modern blast-furnace is a shell of wrought-iron carried on a circular mantle supported by a series of columns or brackets.

The geographical distribution of the blast-furnaces and the production of pig-iron, according to fuel used, for each State, is shown by the annexed table:

States.	Total number of furnaces Dec. 31, 1885.	Production of pig-iron, net tons.			Total.	Percentage.
		Anthracite.	Bituminous.	Charcoal.		
Pennsylvania	248	1,235,248	1,198,100	12,148	2,445,496	54.0
Ohio	81	....	535,945	18,018	553,963	12.2
Illinois	16	....	327,977	....	327,977	7.2
Alabama	19	....	149,865	77,573	227,438	5.0
Virginia	37	....	151,134	....	163,782	3.6
Tennessee	17	....	130,026	31,173	161,199	3.5
New York	42	145,475	....	14,682	160,157	3.1
Michigan	27	....	....	143,121	143,121	1.7
New Jersey	18	73,667	....	....	73,667	1.5
West Virginia	8	....	69,007	....	69,007	1.2
Missouri	11	....	29,623	21,785	51,408	3.4
Kentucky	6	....	32,846	4,707	37,553	
Georgia	4	....	27,127	5,797	32,924	
Wisconsin	13	....	5,003	19,629	24,632	
Connecticut	9	....	....	17,500	17,500	
Maryland	19	....	6,867	10,432	17,299	
Indiana	2	....	6,634	....	6,634	
Colorado	1	....	5,481	....	5,481	
Oregon	1	....	....	3,832	3,832	
Washington Territory	1	....	....	1,857	1,857	
Texas	2	....	....	1,843	1,843	
North Carolina	2	....	....	1,790	1,790	
Massachusetts	4	....	....	869	869	
Maine	1	....	....	440	440	
California	1					
Minnesota	1					
Total	591	1,454,390	2,675,635	399,844	4,529,869	100.00

The following table shows the amounts of pig-iron made with different fuels in each year since 1854, reliable statistics not having been collected prior to 1854. In the column "anthracite" are included the product of all blast-furnaces using anthracite or anthracite mixed with coke; in the column "charcoal" the product of all blast-furnaces using charcoal is found, and in the column "bituminous" is included all pig-iron made with raw bituminous coal or coke. The maximum product in each column is given in full-faced figures:

Year.			Anthracite.	Charcoal.	Bituminous.	Total.
1854	net	tons.	339,435	342,298	54,485	736,218
1855	"	"	381,866	339,922	62,390	784,178
1856	"	"	443,113	370,470	69,554	883,137
1857	"	"	390,385	330,321	77,451	798,157
1858	"	"	361,430	285,313	58,351	705,904
1859	"	"	471,745	284,041	84,841	840,627
1860	"	"	519,211	278,331	122,228	919,770
1861	"	"	409,229	195,278	127,037	731,544
1862	"	"	470,315	186,660	130,687	787,662
1863	"	"	577,638	212,005	157,961	947,604
1864	"	"	684,018	241,853	210,125	1,135,996
1865	"	"	479,558	262,342	189,682	931,582
1866	"	"	749,367	332,580	268,396	1,350,343
1867	"	"	798,638	344,341	318,647	1,461,626
1868	"	"	893,000	370,000	340,000	1,603,000
1869	"	"	971,150	392,150	553,341	1,916,641
1870	"	"	930,000	365,000	570,000	1,865,000
1871	"	"	956,608	385,000	570,000	1,911,608
1872	"	"	1,369,812	500,587	984,159	2,854,558
1873	"	"	1,312,754	577,620	977,904	2,868.278
1874	"	"	1,202,144	576,557	910,712	2,689,413
1875	"	"	908,046	410,990	947,545	2,266,581
1876	"	"	794,578	308,649	990,009	2,093,236
1877	"	"	934,797	317,843	1,061,945	2,314,585
1878	"	"	1,092,870	293,399	1,191,092	2,577,361
1879	"	"	1,273,024	358,873	1,438,978	3,070,875
1880	"	"	1,807,651	537,558	1,950,205	4,295,414
1881	"	"	1,734,462	638,838	2,268,264	4,641,564
1882	"	"	**2,042,138**	**697.960**	2,438,078	**5,178,122**
1883	"	"	1,885,596	571,726	**2,689,650**	5,146,972
1884	"	"	1,586,453	458,418	2,544,742	4,589,613
1885	"	"	1,454,390	399,844	2,675,635	4,529,869

To produce 4,589,613 net tons of pig-iron, in 1884, there was consumed:

Coke	4,140,948	net	tons.
Anthracite coal	1,728,931	"	"
Bituminous coal	366,224	"	"
Charcoal, 50,577,153 bushels, equivalent to	455,650	"	"
Making a total of	6,691,753	"	"

In this estimate 111 bushels of charcoal are assumed as equivalent to one net ton. This is a little more than 18 pounds per bushel, and is probably as close an approximation as can be made for the country at large. The average amount of fuel consumed to produce one ton of pig-iron was as follows: anthracite, 1.50 tons in Pennsylvania to 1.61 tons in New York; an average of 1.52 tons. Bituminous coal and coke, 1.30 tons in Illinois to 2.13 tons in Kentucky, an average of 1.36 tons for the whole country. Charcoal, 97 bushels, equal to .81 tons, in Michigan, to 172 bushels, equal to 1.45 tons, in Virginia; an average of 123 bushels, or 1.03 tons, per ton of iron for the entire country.

Grading of pig-iron is generally by numbers, from four to six numbers being used; but often intermediate grades are represented by half-numbers or some letter connected with a number—thus 4½ indicates a grade between No. 4 and No. 5, No. 2x a grade better than No. 2 but not equal to No. 1. There is a lack of uniformity in grading systems, they being adapted to suit the views of individual furnace managers, but generally the size and character of the grain or the depth of chill determines to the grade. Under ordinary conditions an iron with large, open grain and graphite segregated during cooling is known as No. 1, a smaller grain as No. 2, still closer as No. 3, a fine grain with spots as No. 4, a white and mottled surface as No. 5, and a hard white iron No. 6. Where iron is sold for its chilling qualities the depth of chill formed in the molten iron against a cold iron plate fixes the grade number; thus No. 1 would show no chill, No. 2 a slight chill, No. 3 well defined, etc.

The terms "foundry," "mill," "forge," "hard," "Bessemer," as applied to pig-iron, indicate its adaptability for specific purposes on account of its chemical composition; but often the open grain irons are known as "foundry" iron, the close-grained are "mill" or "forge" iron, and the white or mottled "hard" iron.

If iron when puddled or wrought is brittle at ordinary temperatures it is known as "cold short;" where it breaks under the rolls or hammer at a red heat it is considered "red short" or "hot short." A neutral iron exhibits neither cold nor red shortness.

To a limited extent "mine pig" is applied to iron made entirely from iron ore, and "cinder pig" indicates an admixture of mill or forge cinder with iron ore.

Silicon pig, manganese pig, phospor pig, etc., denote iron containing quantities of these metalloids for special purposes, and an excess of silicon sometimes produces brittle pig, called "carbonized," "glazy," or "silver-gray" pig.

Buckshot is a term applied to iron not thoroughly reduced in the blast-furnace, or to numerous shots of metallic iron in a matrix of cinder.

Salamanders, sometimes called sows or bears, are masses of iron or other solidified material of which iron forms a part which accumulate in the hearth of a blast-furnace.

The following are some typical analyses of American pig-irons:

Analyses of American Pig-irons.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Carbon, combined	0.700	1.17	3.668	.780	....	1.121	.555	.620
Carbon, graphitic	2.200	2.88	.03	2.31	2.85	2.018	3.055	3.358
Silicon	1.770	2.64	3.042	1.307	5.47	4.180	3.259	.433
Phosphorus	0.076	0.066	.055	.294	0.60	.041	.284	.340
Sulphur	trace.	trace.	....	.086	0.04	.018	.004	.024
Manganese	....	....	....	1.512	1.54	....	.766	.581
Slag, etc	....	0.42	....	....	....	.0516		
Iron (by difference)	95.254	92.82	93.205	93.711	89.47	91.276	92.077	94.644

(1) No. 2 pig-iron made from Iron Mountain, Missouri, specular ore, smelted with raw block coal of Indiana.
(2) (3) Bessemer pig-iron from Lake Champlain magnetites, smelted with charcoal.
(4) Made from raw and roasted New York carbonates.
(5) Silver-gray or glazy iron from Pennsylvania limonites and New Jersey magnetites, smelted with anthracite coal.
(6) No. 2 foundry-iron made from Alabama red hematites, smelted with coke.
(7) No. 1 foundry-iron, ditto, made at another furnace.
(8) No. 3 pig-iron, made from Ohio roasted carbonates with coke cold-blast.

Spiegeleisen or ferro-manganese is produced in the blast-furnaces connected with some of the Bessemer steel plants from ores found in Pennsylvania, Virginia, and Arkansas; and several small furnaces in New Jersey are run upon the clinker or residuum of "franklinite" and kindred minerals (found in Northern New Jersey) after the zinc has been extracted. The form of one of the small furnaces is shown in Fig. 6, the product being spiegel containing 15 to 20 per cent. manganese. At some of the larger furnaces connected with Bessemer steel-plants using manganiferous ore, ferro-manganese analyzing 85 to 90 per cent. has been produced in quantity and with economy. The clinker used at the New Jersey spiegel furnaces is of the following general composition: Silica, 18 to 25 per cent.; alumina, 2 to 8; lime, 7 to 12; magnesia, 2 to 4; zinc oxide, 4 to 10; phosphorus, trace to 0.04; iron, 22 to 25; manganese, 12 to 16.

Malleable iron is usually applied to iron castings, principally of small size, made malleable by an annealing process, or by decarbonizing in connection with an oxide of iron.

Cast wrought-iron is produced by melting wrought-iron scraps in crucibles which are highly heated by a hydro-carbon flame. As soon as the mass is melted an alloy of iron and aluminium is added, reducing the melting point so as to permit of obtaining castings of any kind with a very fluid metal; these castings retaining the physical characteristics of wrought-iron, such as tensile strength, welding, and ductility, in a marked degree.

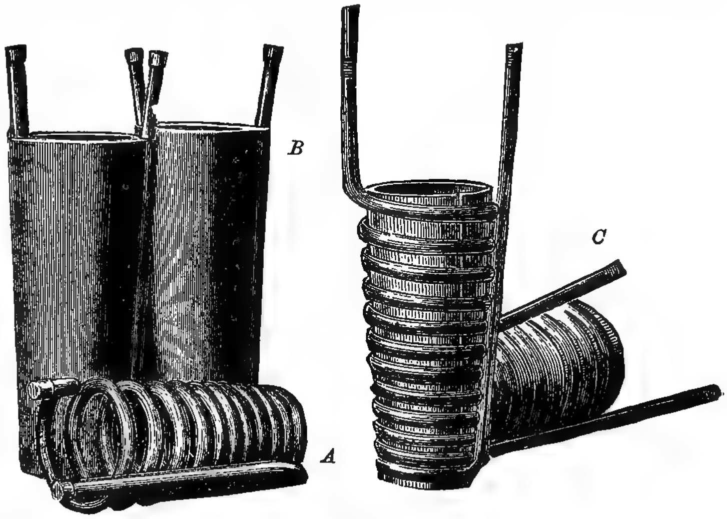


FIG. 12.

Galvanized Iron is a name incorrectly applied to the result of a process of coating iron with zinc, first used in France but since adopted generally, though the process has no connection with galvanism. The iron to be coated is first cleaned by warm sulphuric or hydrochloric acid and water, followed by a scrubbing and other processes of preparation. It is then dipped into a bath of a melted zinc or an alloy, composed of 1292 parts of zinc to 202 of mercury, with one pound of potassium or sodium to each ton of the mixture. This composition melts at 680° Fahr. The zinc is at once deposited on the iron, which must be quickly removed. The process is a highly useful one in the preparation of telegraph wires and of many articles of common use, as it serves to protect the iron from oxidation. The alloy above mentioned is seldom used in America, and for an economical reason sulphuric acid is generally employed.

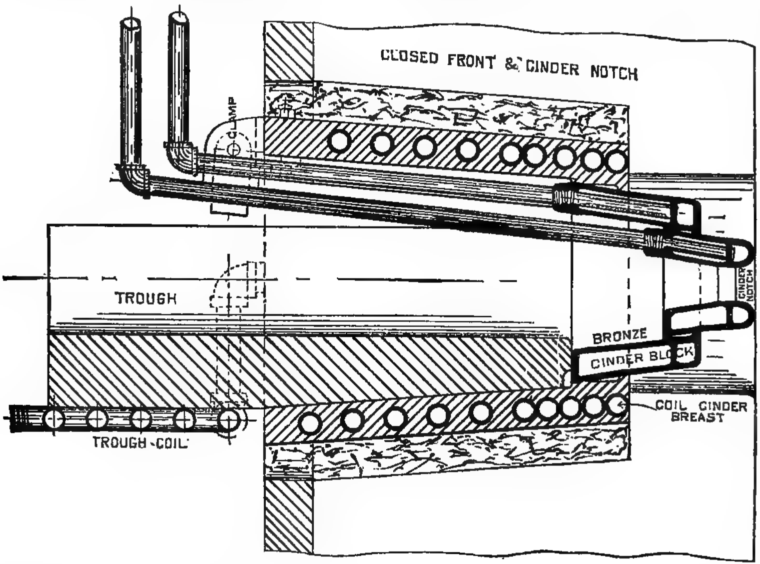


FIG. 13.

The uses to which iron is directly put are exceedingly numerous, there having been an immense development of the foundry and the rolling-mill industries. In addition to the great demand for it in railroad building, the employment of iron in architecture is rapidly increasing and promises to become of high importance in the near future. Other important uses are in bridge-and ship-building, while in its minor utilizations it is indispensable in every manufacturing establishment and every household in the civilized world. As to the general use of iron it may be said that the United States is reported as being in advance of all other nations, the consumption of iron and steel being annually about 220 pounds for every inhabitant of the country, while Great Britain, which comes next, consumes less than 200 pounds per inhabitant.

FORGES are open or partially open fire-places or hearths where iron is produced or heated for manipulation by means of forced blast delivered by a tuyere or tuyeres into the solid fuel.

Blacksmiths' fires are generally called forges.

The *bloomary fire* or catalan forge produces metallic iron directly from iron ore by reducing it and agglomerating it into a *loupe* in a partially open hearth fed with charcoal and supplied with preheated blast.

The *sinking fire* or forge differs from the bloomary in using cold-blast chiefly, and in remelting pig-iron, *run-out metal*, or scrap-iron to produce loupes.

FORGE is ordinarily considered as embracing the entire plant of a series of bloomary or sinking fires, including the fires themselves, the *run-out fires*, and the hammers for reducing the loupes to blooms, slabs, or billets. In iron rolling-mills the forge is often alluded to as that part of the plant where the iron is *puddled* and the puddle balls squeezed or hammered and rolled into puddle bars, and sometimes the name is applied to that part of iron establishments where the metal receives its first treatment under power hammers, or to iron manufactories where wrought-iron is treated by hammering. The use of the word forge carries with it the association of hammers operated by steam or water-power, and *forgings* are pieces of metal formed under the hammer while hot and not cast or rolled to shape.

Drop forgings are forms of heated metal produced by stamping with dies.

The statistics of production, however, treat as *forges* only the plants employing sinking and run-out fires, to produce blooms from pig-iron and scrap, or bloomaries to make blooms or billets from ore.

The following gives the production for a series of years of each of the above class of blooms, but does not include the product of a number of scrap-iron sinking fires which are operated as part of rolling-mill equipment, and from which no returns are made :

Production of Blooms and Billets in the United States.

Years.	Blooms and billets from ore.	Blooms from pig and scrap iron.	Total. Net tons.
1874	36,450	25,220	61,670
1875	24,416	24,827	49,243
1876	20,784	23,844	44,628
1877	24,227	23,073	47,300
1878	24,139	25,906	50,045
1879	30,282	32,071	62,353
1880	40,652	33,937	74,589
1881	45,369	39,237	84,606
1882	48,354	42,939	91,293
1883	35,237	39,521	74,758
1884	29,789	27,216	57,005
1885	19,887	21,813	41,700

The fuel used in the sinking and bloomary fires is charcoal, but the refining of pig-iron in the run-out fires is done with coke or with mixtures of charcoal and coke.

PUDDLING consists in submitting pig-iron to the action of flame in a reverberatory furnace lined with iron oxide, and working the molten metal into a ball by methods similar to forming a "loupe" in the forge fire. The silicon is first oxidized, then the phosphorus, and lastly the carbon. The silicic and phosphoric acids enter the cinder which is tapped off, and the carbonic oxide burns as it escapes from the bath of metal. Sixty to eighty per cent. of phosphorus is eliminated in this process, which is the first step in producing manufactured iron from the pig metal. As the labor of puddling is severe various devices have been designed with a purpose of reducing this item. Revolving hearths, tubular rabbles, vibrating or revolving mixers, and, lastly, rotary furnaces, have been experimented with, and some good results obtained, but as far as the puddling furnace is concerned it remains nearly in the condition it was fifty years ago. Economies in construction and handling balls have been introduced, but the actual labor of puddling is but little lessened.

Although firing with solid fuel—generally fine bituminous coal or slack—is still generally employed, the use of gas produced from coal is growing in favor, and in the districts where natural gas is obtained it is superseding firing with coal.

The practice of carrying boilers for generating steam above the puddling-furnaces is general, although in some new plants the boilers are separately fired. The types of boilers are principally plain cylinders or double-flue boilers, and to a limited extent water-tube boilers are connected with furnaces. Double puddling-furnaces are favored as economizing space and permitting of larger charges which can be worked from doors on either side of the furnace. The intermediate grades of pig-iron, numbers 3 to 5 according to the grading above given, are preferred for puddling. The cinder tapped from these furnaces containing silica, oxides of iron, phosphoric acid, sulphur, etc., is in demand for smelting in the blast-furnaces in producing cinder pig. It averages 50 to 60 per cent. of metallic iron, and carries less phosphorus and silica than many natural ores, and often cinder pig suffers more from its name than from its composition.

From the puddling-furnaces the balls are passed through a squeezer or under a hammer. The squeezers are most generally used, and the jaw or crocodile type has given place to the rotary squeezer, a cast-iron well with corrugations, within which revolves a corrugated cylinder placed eccentrically to the shell. Hammering or squeezing reduces the volume of the ball into a bloom and forces out the cinder. From the squeezer or hammer the puddle blooms are taken to the puddle or muck, or roughing train of rolls, from which it emerges as a puddle or muck bar. This bar is cut into short lengths by shears, and the pieces placed in piles and put into heating furnaces. From thence they pass through rolls of various sizes or arrangements according to the purpose for which the iron is to be used.

The subject of rolling iron for its various uses, and in its varied methods, will be fully discussed under the appropriate head. As showing the progress of this branch of the iron industry, however, the following tables are inserted at this place. (See ROLLING MILLS.)

Production of Rolled Iron in the United States in 1885.

(*By States.*)

States.	Bar, rod, bolt, hoop, skelp, and shaped iron. Net tons.	Plate and sheet iron except nail plate. Net tons.	Iron cut nails. (Steel excluded.) Net tons.	Iron rails. Net tons.	Total rolled iron. Net tons.
Maine	8,219	....	....	....	8,219
N. Hampshire	500	....	....	....	500
Massachusetts	39,051	7,991	28,032	....	75,074
Rhode Island	13,723	....	....	....	13,723
Connecticut	15,054	....	....	....	15,054
New York	77,748	3,905	....	....	129,426
New Jersey	38,689		9,084	....	
Pennsylvania	564,350	252,711	117,965	5,839	940,865
Delaware	20,342	8,379	....	....	28,721
Maryland	11,147	6,434	....	....	17,581
Virginia	20,687	....	11,302	....	31,989
Alabama	14,250	2,750	6,850	1,000	24,850
Texas	750	....	....	200	1,000
West Virginia	187	13,040	4,505	....	31,728
Kentucky	9,477		4,519	....	
Tennessee	8,765	....	2,398	181	11,344
Ohio	210,605	41,390	16,596	672	269,263
Indiana	19,913	....	13,713	1,914	35,540
Illinois	58,868	1,550	16,138	3,800	80,356
Iowa	800	....	....	....	800
Missouri	6,628	4,919	....	....	11,547
Michigan	10,840	2,000	....	....	12,840
Wisconsin	34,444	....	4,188	327	38,959
Minnesota	1,200	....	....	....	1,200
Nebraska	....	....	3,000	....	3,000
Colorado	1,710	....	3,216	612	5,538
Wyoming Ter.	2,210	....	....	220	2,430
California	10,801	....	2,178	....	12,979
Total	1,200,958	345,069	243,684	14,815	1,804,526

Production of Rolled Iron in the United States.

(*By Years.*)

Years.	Net tons of 2000 pounds.		
	Iron rails.	Other rolled iron.	Total.
1864	335,369	536,958	872,327
1865	356,292	500,048	856,340
1866	430,778	595,311	1,036,089
1867	459,558	579,838	1,029,396
1868	499,489	598,286	1,097,775
1869	583,936	642,420	1,226,356
1870	586,000	705,000	1,291,000
1871	737,483	710,000	1,447,483
1872	905,930	941,992	1,847,922
1873	761,062	1,076,368	1,837,430
1874	584,469	1,110,147	1,694,616
1875	501,649	1,097,867	1,599,516
1876	467,168	1,042,101	1,509,269
1877	332,540	1,144,219	1,476,759
1878	322,890	1,232,686	1,555,576
1879	420,160	1,627,324	2,047,484
1880	493,762	1,838,906	2,332,668
1881	488,581	2,155,346	2,643,927
1882	227,874	2,265,957	2,493,831
1883	64,954	2,283,920	2,348,874
1884	25,560	1,931,747	1,957,307
1885	14,815	1,789,711	1,804,526

IRON-CLADS. Early in the Christian era lines of metal shields were placed along the upper parts of vessels to protect the crews. In 1530 one of the fleet of the Knights of St. John was sheathed with lead, and successfully resisted all the shot of that time.

The idea of armor protection was adopted by the Chevalier d'Arçon in the construction of ten floating batteries for the attack upon Gibraltar. These batteries had wooden hulls, from 600 to 1200 tons displacement, armed with from 10 to 29 guns, protected by bars of iron. The deck was solidly roofed over, and covered with green hides. At the attack upon Gibraltar, Sept. 13, 1782, these ships were destroyed by fire, so that their practical efficiency was not put to the test.

However as regards the genesis of the *iron-clad*, it may be said that it was the outcome of the invention of explosive projectiles, by the French Gen. Paixhans, about 1819, to be fired from guns and mortars, the terrible efficiency of such fire against ordinary ships of wood showing conclusively that protection of some sort was necessary. In 1841 Gen. Paixhans advocated armoring the sides of vessels as a means of protection against his explosive projectiles. His plans were rejected by the French government, but they called attention to the subject of naval armor.

In 1842 Robert Stevens, of Hoboken, N. J., submitted to a congressional committee on coast defences the designs of armored steam-vessels, together with the laws of penetration of projectiles into iron armor, deduced from experiments made by him. These laws were at once investigated in England and France, and his report led to the commencement of the Stevens' Battery, by the order of the U. S. government, in the spring of 1854. This vessel was never completed.

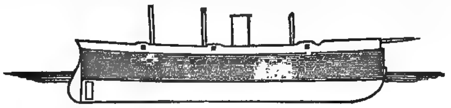
The initiative in armored naval construction was really taken by the French. At the beginning of the Crimean war Napoleon III., feeling that any attack on Cronstadt or Sebastopol with unarmored ships could only result in failure, ordered the construction of floating batteries, protected against shot and shell by iron armor. These batteries, five in number, were begun in September, 1854, and were all launched by July, 1855. They were of 1600 tons displacement, with a speed of about ten knots, each carrying 16 guns of the same power as the American 68-pounder. The armor consisted of 4½-inch iron plates fastened to 27¾ inches of oak backing by 1½-inch through bolts, spaced about one foot apart around the edges of the plates, with counter-sunk heads, and inner ends threaded to set up with a plain nut. Three of these vessels, forming the first iron-clad squadron, on the 17th of October, 1855, silenced in four hours the Kinburn forts, which had before withstood the united attacks of the French and English fleets. One vessel was hit 65 times, the maximum penetration being only 1½ inches. The great success of the iron-clad in this fight demonstrated the practical efficiency of an experiment which was the offspring of the intelligent union of theory and bold speculation.

The Kinburn Batteries.

The English shortly after the French vessels were built began the construction of three similar ships of 1850 tons protected by 4-inch armor, and carrying 10-inch shell-guns.

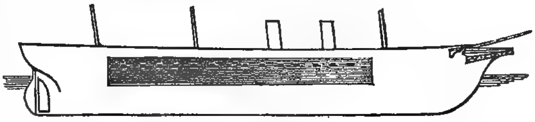
The French authorities now determined to build iron-clads having satisfactory sea-going qualities, but before elaborating a design experiments were made to determine the best methods of construction. The 68-pounders were then the service guns, and 5-inch armor was found to be sufficient to withstand their fire. The thickness of plating and the methods of construction having been decided on, designs were called for, and from those sent in by numerous competitors that of the constructor Audenet was selected, and finally carried into execution in the building of the iron ship Couronne.

In the meantime the 5000-ton wood ship Napoleon had been selected for conversion into an iron-clad. The upper two decks were removed, and the vessel thus razeed was lengthened 23 feet and armored from stem to stern. This ship, named the Gloire, proved so successful that it was determined to follow up the principle without delay by constructing a large fleet of similar vessels, with such modifications as experience might suggest. Two other vessels of identical design were begun at Cherbourg and Toulon. The three wooden frigates together with the Couronne were completely armored with 5-inch plates resting on 26 inches of wood. The armament consisted of 36 5-ton guns carried in a single battery extending the whole length of the ship.



The Gloire.

The construction of this iron-clad squadron was not at first regarded by the maritime powers as the opening of a new era in ship-building for war. In England especially it was condemned as a visionary and costly experiment in which France would squander several millions with no other result than the addition to her fleet of a few floating batteries, which could only be available at important points along the coast. This idea was, however, short-lived, and public opinion did not await the launching and trials of the Gloire before a conviction was established that the English navy should possess the same novel and formidable types of fighting ships as had been introduced into the French navy. Being thus compelled to follow in the path so confidently taken by the French, designs were prepared by the chief constructor of the British navy, in consultation with Mr. Scott Russell, from which the Warrior, Black Prince, and with some slight modifications the Achilles were built. The Warrior and Black Prince, of 9210 tons each, were protected by plates 4½ inches thick resting on 18 inches of timber, behind which was an inner skin nine-tenths of an inch thick. The extremities were unprotected.

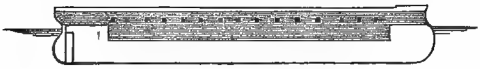


The Warrior.

To show what an immense stride had been taken in naval construction, and the great advance on all previous war ships in design, construction, and armament, we have only to note the following characteristics of the Warrior. Being built of iron she was structurally stronger and less liable to be destroyed by fire. Vital parts, such as boilers, engines, magazines, shell-rooms, and battery, were protected by armor that could not be pierced at a distance of 200 yards by any gun that could be brought to bear against her at sea. She carried the heaviest guns afloat, also a ram strong enough to sink any wooden ship, and could steam at 14 knots an hour. Her defects were unprotected steering gear, a weak stern, due to the lifting propeller well, and too great length. The Defence and Resistance were constructed after a similar type, with length reduced 99 feet.

In 1861 England was in the same relative position as France in 1859, but ship construction was pushed with great rapidity both in the private yards and the royal dock-yards, in consequence of which, in 1865, England had thirty iron-clads, and had reasserted her superiority at sea. In 1861, following the four iron-clads above mentioned, the English laid down eleven iron-clads, representing four different types. The list included the Achilles, two ships of the Hector type, five wooden ships, and three ships of the Northumberland type.

The armor of the Achilles extended the whole length of the ship at the water-line. The ships of the Hector type were completely protected above the water, and amidships the armor was carried below the water.



Hector and Valiant.

The wood ships had armor similar to that of the Warrior, extending from below the water-line to the upper deck. In the Northumberland type the rudder head and steering gear were protected by armor, which extended forward in a belt the whole length of the ship, In this type the armor, instead of being of uniform thickness as in the Warrior, varied in thickness according to the relative importance of the protected parts, being 5½ inches over the water-line throughout the space occupied by the engines, boilers, and magazine, and in wake of the battery, diminishing to 4½ inches at the bow and stern.

This period marks the beginning of the remarkable development in naval ordnance which is still going on. The 100-pounder Armstrong took the place of the 68-pounder in the broadside battery of ships, but the thickness of armor was not increased on that account, so that by the time the Gloire was completed her 68-pounder battery was practically obsolete, and her armor of 4½ inches not thick enough to withstand the fire of service guns. To show the progress of the race which had now begun between armor and guns it is only necessary to state that during the experiments at Shoeburyness in 1862, two shots, with 150 lb. spherical projectiles and 50 lbs. of powder, passed completely through the Warrior target, hitherto considered invincible.

The French introduced the 7¾ and 15½-ton guns into their armaments in 1864, but it was not till 1865 that they determined to increase the thickness of their armor, which led to the laying down of the Océan, protected at the water-line by 8-inch armor on 32½ backing. The armament consisted of four 23-ton guns in a central battery, at the corners of which were four 15½-ton guns in barbettes; the whole protected by 6½-inch armor on 24½-inch backing. Three other ships were built of a nearly similar type. Even before the Océan was launched in 1868 the armor she carried was inadequate to withstand the fire of the 23-ton guns then in use. The Richelieu, Colbert, and Trident, begun in 1868–69, were plated with 9-inch armor. The hulls, with the exception of the extremities, were of wood. They carried six 23-ton and one 15½-ton gun.

After the Franco-German war it was decided that the French navy should have an armored fleet of 16 first-class, 12 second-class, and 20 coast-service vessels of the first and second class—all to be built of steel. The twin-screw vessel Redoutable was first begun, armored with 14-inch plates over the water-line amidships. The central battery, protected by 10-inch plates, consists of four 23-ton guns. Above the casemate are two 23-ton guns in light half-turrets.

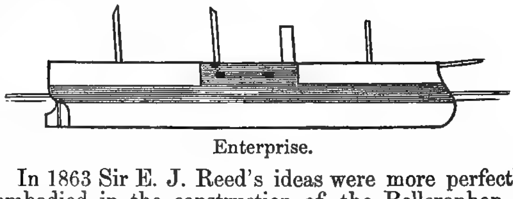
The Dévastation, begun in 1876, is one of the most heavily armored, full-rigged armor-clads. The armor belt has a thickness of 15 inches amidships, tapering to 11¾ inches at the ends. The belt stops 28 feet short of the stern, where it is replaced by an armor bulkhead 11¾ inches thick, and a 2-inch deck below the water-line. The battery has 9½ inches of armor, and the deck over the belt is 2¼ inches thick. The armament of the Dévastation consists of four 12¾-inch guns in the armored battery. Before and abaft the battery the sides of the ship tumble home so as to admit of a direct fire ahead and astern within an angle of 15° with the keel. (See Plate XXXV.) Two 10½-inch guns are mounted in half-turrets on the upper deck, and can fire both ahead and astern. Six 5½-inch guns are distributed along the upper deck. The Amiral Duperré, begun the same year, is larger than the Dévastation. In her the armored central battery is abandoned, and a belt 21½ inches thick carried completely round the water-line, above which is an armored deck. On the upper deck are four armored barbettes, each carrying a 48-ton gun. There are fourteen 5½-inch rifles forming an unprotected battery between decks, and twenty Hotchkiss machine-guns. The second-class sea-going iron-clads are represented by the Duguesclin, of exactly similar type as the Amiral Duperré, though smaller.

The first-class coast-defence vessels are admirably represented by such ships as the Tonnerre of 5580 tons. (See Plate XXXV.) She has a low hull with a complete armored belt, covered by an armor deck, above which rises a breastwork with a revolving turret above its fore-end, mounting two 10½-inch guns.

The second-class coast-service vessels, such as the Tempête, are much the same, only of less displacement and draught. The development of heavy ordnance, begun by the French in 1864, led to a complete change in the construction of ships. Previous ships had been armed with a great number of light guns. The new guns being much heavier were fewer in number, and they could be concentrated and protected with greatly reduced area of armor, though the armor was of a thickness in keeping with the battery carried. Experience in iron construction led to a saving of weight in different parts of the hull, which could be utilized in guns and armor.

Sir E. J. Reed was in 1862 appointed chief constructor of the British navy, and his appointment gave a new and remarkable impetus to naval construction for purposes of war, as he introduced radical changes in the types of British iron-clads, an example soon followed by other nations. The type of ship introduced by him was one carrying behind armor a small number of the largest guns afloat, concentrated amidships, instead of a great number of small guns scattered throughout the ship. The engines, boilers, magazines, and shell-rooms were protected by a belt of armor fore and aft, extending from 5 feet below to 5 feet above the water line. The concentrated battery was protected at the sides by armor, and from a raking fire by an armor-plated bulkhead. Two guns were placed forward when practicable, protected by a shield of armor-plating around the bow.

This type, allowing a great reduction in the size of iron-clad ships without any loss of offensive or defensive power, was favorably looked upon by the admiralty, and orders were given for the conversion of the three wooden ships, the Enterprise, Favorite, and Research, upon his plans. In the Enterprise the central battery, carrying four guns, and the water-line were protected by armor, and though only of 1000 tons displacement, she carried heavier guns than any vessel of her date.

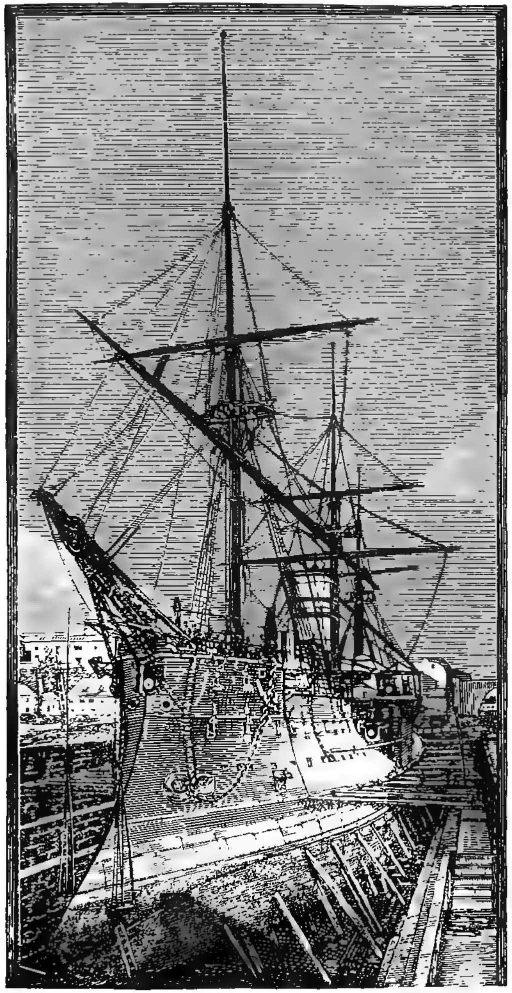


Enterprise.

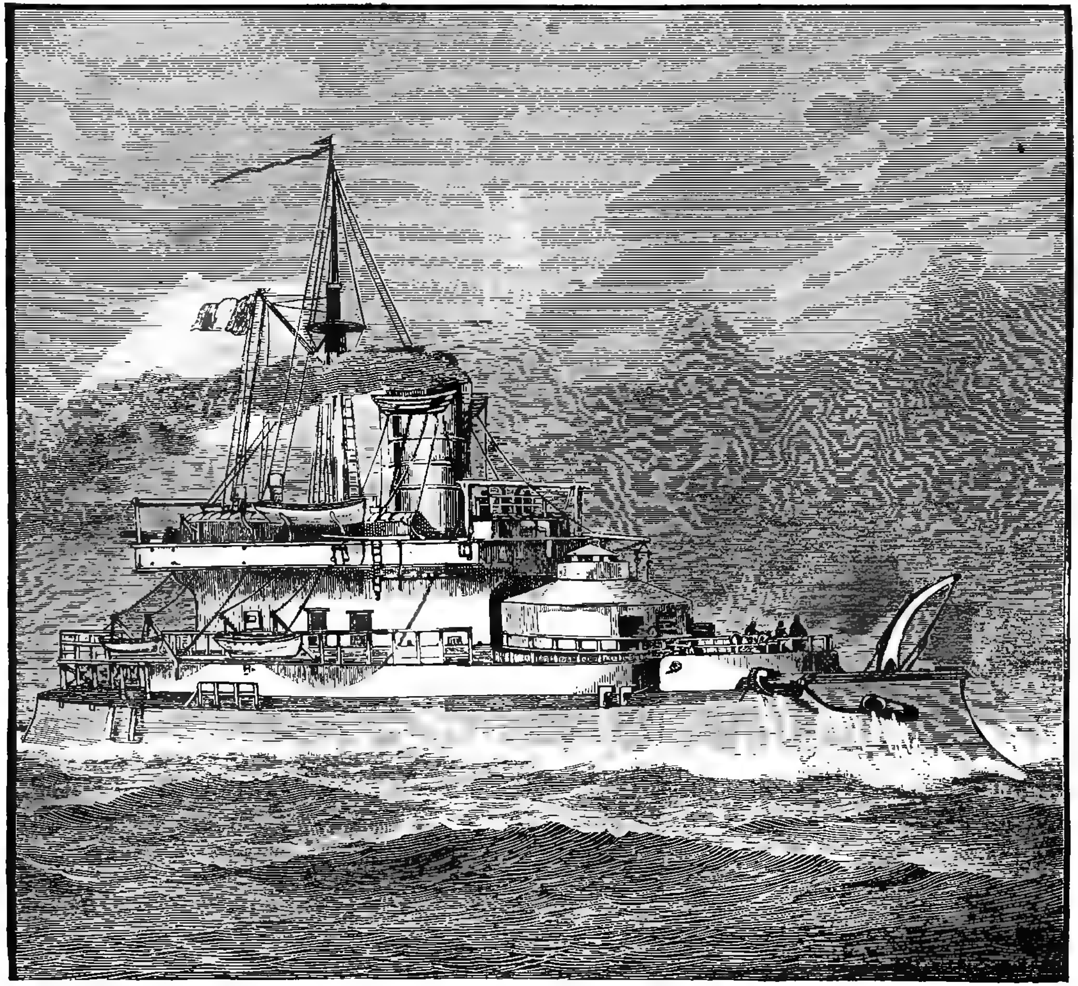
In 1863 Sir E. J. Reed's ideas were more perfectly embodied in the construction of the Bellerophon, a ship 300 feet long, 56 feet wide, and draught 21 feet forward and 26 feet aft. While retaining the central battery, the bow-fire was made a prominent feature. Plates 6 inches thick were used to resist the 300-pounder guns, which at this time began to supersede the 100-pounder.

IRON-CLADS.

PLATE XXXV.

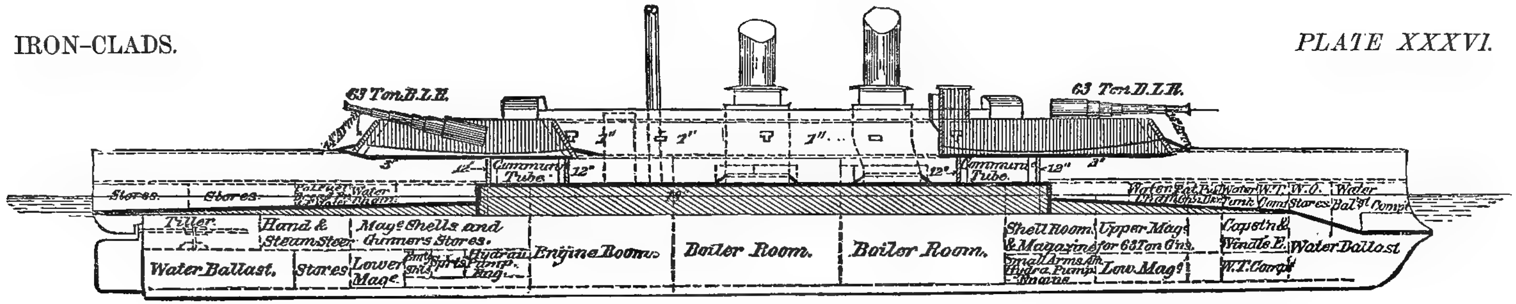


DÉVASTATION.

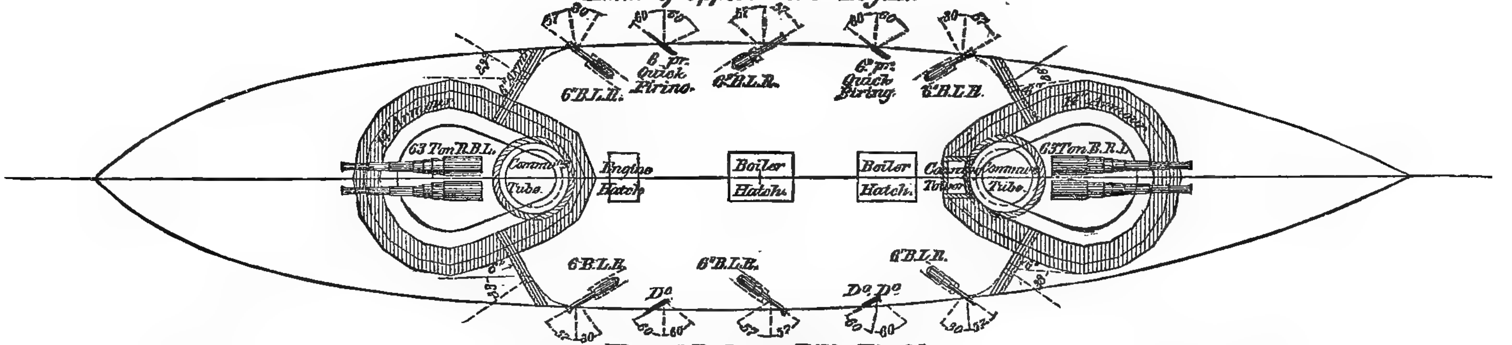


TONNERRE.

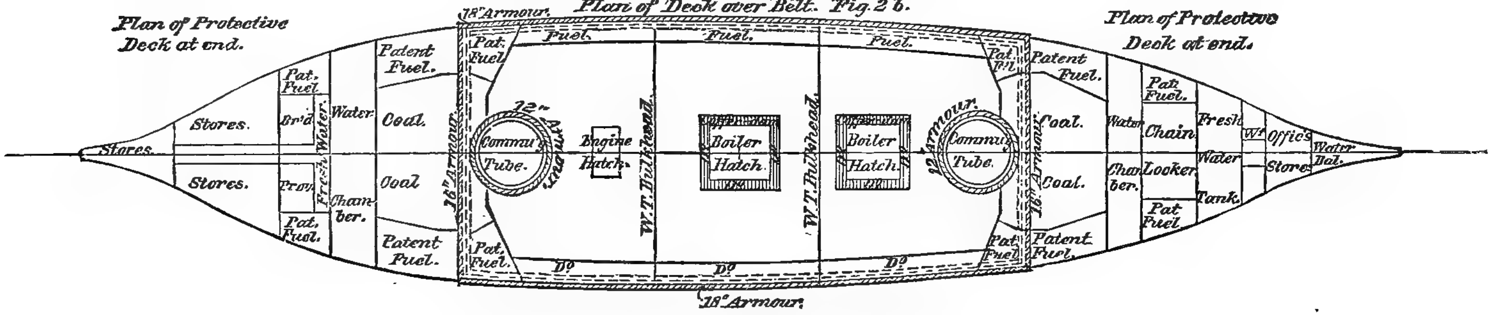
PLATE XXXVI.



Plan of Upper Deck. Fig. 2a.



Plan of Deck over Belt. Fig. 2b.

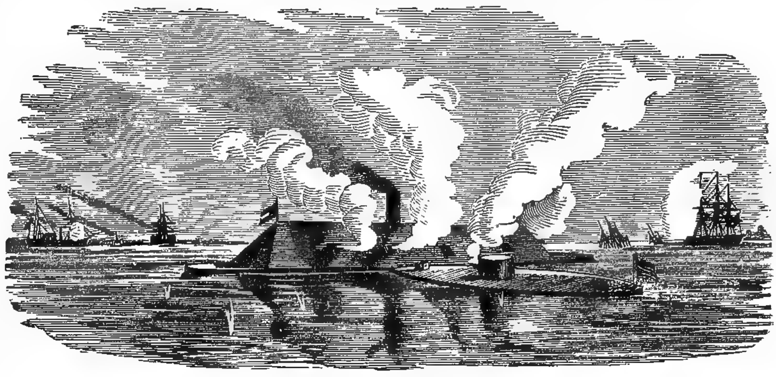


H. M. S. CAMPERDOWN (ADMIRAL CLASS).

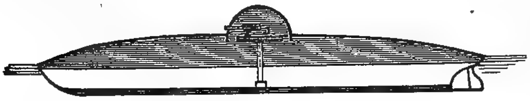
These 6-inch plates were used on the broadside amidships for 90 feet, extending from 5 feet below the water-line to the level of the upper deck. This space contains the central battery of ten 12-ton guns. Forward and abaft the battery the ship is protected by a belt of the same thickness, extending to a depth of 5 feet below the water-line, and rising 6 feet above.

Bellerophon.

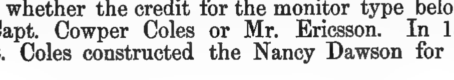
In the mean time the civil war in America had begun, and at its outbreak a special naval committee was appointed to investigate and recommend types of iron-clads for the United States. Three distinct types of iron-clads were recommended: the Galena, New Ironsides, and Monitor. The Galena was armored with 2½-inch plates, fastened in such a manner that they were easily racked or broken, and the vessel failed in her first engagement before Fort Darling. The New Ironsides was a casemated iron-clad frigate with a complete armor belt—speed about 6 knots. The armor was 4½-inch plates, inclined at 30° on the casemate, backed by 21 inches of oak. The plates were fastened by iron-wood screws similar to those used by the French (described hereafter), except that water tightness was insured by counter-sinking rubber tubing into the backing around the bolt just back of the armor. The battery consisted of fourteen 11-inch smooth-bores, and two 8-inch Parrott rifles, the first of this size carried into action. The ports were protected by heavy shutters. For two years this vessel was continually on the most severe service, involving blockade duty and close action against fortifications; and during a period of six months, though she was hit 193 times, she was not obliged to go into a home port or ask for assistance.


Monitor and Merrimac.

The Monitor was designed by John Ericsson, her design having been among the competitive designs called for Aug. 7, 1861, and accepted Sept. 16, 1861. Mr. Ericsson it appears had submitted a similar design to the Emperor Napoleon III. in 1854, consisting of an armored deck and armored cupola on a vessel of low free-board, but as the French had already begun the iron-clad batteries before mentioned they were not disposed to try any other experiments at the time.


Ericsson's Cupola Vessel.

This vessel doubtless represents the idea from which the Monitor sprang. There is a diversity of opinion as to whether the credit for the monitor type belongs to Capt. Cowper Coles or Mr. Ericsson. In 1855 Capt. Coles constructed the Nancy Dawson for the British government for service in the Sea of Azov during the Crimean war. She was a small turreted vessel intended to fight bows on, really being but little more than a raft carrying a heavy protected gun. The Rolf Krake, designed by Coles, was laid down before the Monitor, but was longer building, so that to Ericsson belongs the credit of having floated the first revolving turreted vessel, though the Monitor was not a sea-going iron-clad, while the Rolf Krake is still a serviceable sea-going vessel.


The Rolf Krake.

The Monitor was a flat-bottomed vessel of about 1300 tons displacement, armored on the sides and on the deck, which was only 18 inches above the water. She carried a single revolving turret, mounting two 11-inch smooth-bore guns, having an all-round fire, except directly ahead, where the fire was cut off by an armored pilot tower. The hull was of iron. The side armor was made up of five 1-inch plates, tapering to three plates at the bottom, on 23 inches of backing. The deck was formed of two 1-inch plates on 6 inches of wood. The turret was made up of eleven thicknesses of 1-inch plate. The three inner thicknesses broke joints and were riveted together, thus forming a strong ring of plating, to which the outer plates were attached by through-bolts secured by nuts on the inside. These nuts inside were found to be a source of great danger in the turrets, as shot no larger than a 32-pounder, striking between the bolt-heads, caused these nuts to fly off with great violence.

From 1862 till the close of the war a great number of armored vessels were built. The wood frigate Roanoke was converted into an iron-clad, armored at the water-line with 5½ plates and having three turrets, armored with 11-inch laminated plates, each carrying two guns. The vessels next after the Monitor were the Comanche, Catskill, Jason, Lehigh, Montauk, Nahant, Nantucket, Passaic, Weehawken, and Patapsco. These were of 1875 tons displacement, and differed from the Monitor in mounting the pilot-tower on top of the turret, and enlarging the turret to carry two 15-inch smooth-bore guns. Their speed was but little over 5 knots. The success attained by these vessels led to a rapid increase in the number of monitors for coast service.

Screw vessels were not well adapted for service in the Southern rivers, so that a number of heavily armed side-wheel steamers were built, of light draught and having both ends alike. Mr. Ericsson aimed at making the Dictator and Puritan sea-going vessels with high speed and great coal-carrying capacity. The Dictator was completed, but was found to be much heavier than expected, and to have only two-thirds the designed free-board. She could only carry one-half the intended coal supply, and instead of the expected 16 knots she only made 9 knots on her trial trip. The Puritan has never been completed. At the end of the war it was determined to build four wooden double-turreted, sea-going iron-clads—the Miantonomah, Monadnock, Terror, and Amphitrite. They were to carry 6-inch armor on the water-line and 12 inches on the turrets. The Miantonomah safely crossed to England and returned. The vessels becoming antiquated, it was decided in 1874 to break them up and rebuild them in iron; but owing to lack of appropriation they are still unfinished.

The Southern Confederacy, without skilled labor, and with limited means, succeeded in creating an iron-clad navy that called forth the admiration of both sides. The Merrimac was sunk by the Federals at Norfolk, Va., and afterwards raised by the Confederates, razeed and converted into an iron-clad. The sides were armored with 4-inch plates, and over the deck a sloping iron roof was built of about the same thickness, affording cover to guns and gunners. The armament consisted of ten 8- and 9-inch Dahlgrens, and two 7½-inch rifles, mounted in ports cut in the sloping roof. The Atlanta was converted from an iron-hulled steamer. To carry the additional weight, due to the armor and guns, her displacement was increased by securing logs along the side, and plating over them with iron. The battery was carried in a central citadel, sides sloping at 30°, covered with 2 layers of 2-inch iron plates 7 inches wide, the inner layer horizontal, the outer vertical. The Tennessee was a somewhat similar vessel, built of wood. The armor on the side of the casemate was in three thicknesses of 2-inch plate, the outer thickness reducing to one inch at the ends.

The iron-clad fleet of England was increased under Sir E. J. Reed by the addition of vessels embodying the principles of the Bellerophon. In the Sultan 2 guns were mounted in an upper deck battery over the after end of the citadel instead of at the stern, while the bow-guns were unprotected. In the Audacious class the heavy guns were mounted in two tiers in a central battery. In the Alexandra the lower battery tier is much longer, and the forward part is constructed with indented ports armed with 18-ton guns. In the Temeraire, the last central-battery ship so far constructed for the British navy, in order to obtain an all-round fire, barbette towers were placed forward and aft on the upper deck, in which guns were mounted on the disappearing system. In the Shannon the water-line is protected by a belt extending to within 60 feet of the stern, beyond which an under-water protected deck is worked. This deck was suggested by Mr. Barnaby. The guns are not protected except from forward. In the Nelson and Northampton another step was taken, leaving the after end unprotected, and working an armor deck as at the forward end of the Shannon. This step was an important one, and marks the beginning of a disposition of armor which is still adhered to by the English.

In 1864 two small monitors building for the Confederate States were seized and subsequently purchased by the British government. Their trial led to the construction of the ships Royal Sovereign and Prince Albert, each with four turrets. Capt. Coles, who advocated the turret system as against Sir E. J. Reed's broadside ships, was vigorously supported by the press, and finally it was decided to build the Monarch, an armored sea-going ship, carrying four 20-ton guns in two turrets. Capt. Coles, protesting against this ship being considered as embodying his ideas, was given authority to construct the Captain, a full-rigged, double-turreted, sea-going armored ship. When completed she floated 2 feet deeper than designed, and this limited free-board, with a great spread of canvas, led to her being capsized. This accident caused the admiralty to abandon the construction of fully rigged sea-going turret ships. The great advantages of the turret were, however, recognized, and the system adopted for mastless ships. The first turret ships had less free-board than the American monitors, thus diminishing the weight of the armor. An armored breastwork protected the turning-gear of the turrets, the base of the funnel, and the hatchways. The Glatton, Cyclops, Gorgon, Hecate, and Hydra for the admiralty, and the Cerebus, Magdala, and Abyssinia for the colonies, of the above type, were laid down in 1866.

The Hotspur, an iron-clad ram, laid down the same year, originally had a single large gun mounted in a fixed oval turret, as it was feared that the shock of ramming would injure a movable turret. She has since been fitted with a revolving turret, carrying two guns. The Rupert, constructed somewhat later, is a ram with a breastwork of larger dimensions than the Hotspur.

Looking to battle-ships of the first class the admiralty ordered the preparation of designs for an armored, mastless, sea-going turret vessel, and in April, 1869, the Devastation was begun. When, in 1870, the Captain was lost, doubts as to the safety of turret ships led to the appointment of the committee on designs. This committee expressed an opinion that the stability of the Devastation was ample, and recommended this type of vessel, likewise the abandonment of sails as a means of increasing armament and coal supply. Certain modifications were recommended to increase the stability and improve the accommodations of the crew. The armored breastwork, as in the Glatton, did not extend out to the side, so the side of the ship was carried up by an unarmored superstructure to the height of the upper deck of the armored breastwork, and the weight of the armament was increased. The Thunderer is a similar vessel. In the Dreadnaught the breastwork was made of the same width as the ship itself. During the construction of the Dreadnaught Mr. Barnaby, who had succeeded Sir Edward Reed, wished to adopt an echelon disposition of the turrets, to enable three of the four guns to be fired ahead or astern. This proposal, at first rejected, was adopted somewhat later, in the Inflexible.

The Inflexible is a twin-screw, double-turreted vessel, with a central armed citadel. She was begun February, 1874, and launched April, 1876. Her length is 320 feet, breadth 75 feet, mean draught 24 feet 5 inches, and displacement 11,407 tons. The protected portion consists of a floating citadel 110 feet long and 75 feet wide, extending 6 feet 5 inches below and rising 9 feet 7 inches above the water. From each end of this citadel an armored deck 3 inches thick, 6 feet 6 inches below the water-line, runs to the extremities of the vessel, depressed forward to strengthen the ram. Above this deck is a belt of cork 4 feet thick and 8 feet high, and back of this a belt of oakum, and canvas 2 feet thick, and a number of water-tight compartments. It is held that this part of the ship may be riddled by projectiles without a serious loss of stability. Above the citadel are two turrets, each mounting two 80-ton guns, armored with 7-inch iron plates, outside of which is a 9-inch compound plate. These are set diagonally at opposite corners of the citadel. The armor on the sides and forward end of the citadel is 24 inches thick and 22 inches at the end. After the Inflexible, the Ajax and Agamemnon, of the same type but smaller dimensions, were laid down. The Colossus and Edinburgh, launched in 1882, are also of the same type, but are built of steel, have compound armor 16 inches thick, and carry 43-ton breech-loading guns.

The Admiral class of vessels, consisting of the Collingwood, Rodney, Howe, Anson, Camperdown, and Benbow, retain the central citadel and under-water armor-deck, but mount their heavy guns *en barbette.* This arrangement dispenses with the upper part of the citadel, which protected the turning and loading-gear of the turrets, the connection between barbettes and belt for the passage of ammunition being made by armored tubes. The Collingwood carries four 43-ton guns, the Benbow two 110-ton guns, and the rest of the class each carry four 63-ton guns, while all carry batteries of 6-inch rifles, protected from machine-fire by one-inch plating on the sides.

The latest first-class ships laid down are the Renown and Sanspareil. They are to be of steel throughout; displacement, 10,470 tons. They carry two 110-ton guns in a turret on the main deck, and an upper deck battery of twelve 6-inch rifles, with an 18-ton stern chaser on the spar deck. The armor is steel-faced, 18 inches thick, and 3-inch armor-decks cover the citadel and run from the ends to the extremities.

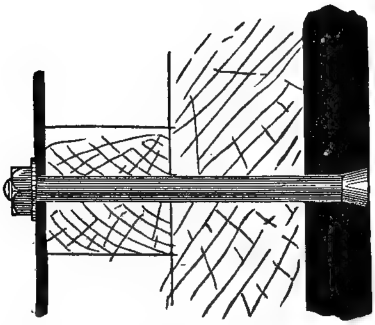
The cruising iron-clad masted fleet has been augmented by the addition of the Imperieuse and Warspite, central citadel ships, sheathed with wood and copper, protected by 10-inch armor, and carrying four 18-ton guns in four armored barbettes. The Orlando, Undaunted, Narcissus, Australia, and Galatea, ships of the belted cruiser class, now building, are to have 10-inch armor, and to carry two 18-ton and ten 6-inch rifles.

Of the Italian ships of the most recent design the Duilio, of 10,400 tons, is a good example. She has a central citadel, 21 inches thick, with under-water decks forward and aft; above this citadel is another, 17.7 inches thick, enclosing the bases of the turrets and the gear for loading and working the guns. Above this rise the two turrets, placed diagonally in opposite corners, armored with 17.7-inch plates, and each carrying two 110-ton guns. The Dandolo is a sister ship.

Ships in which the boilers, engines, and magazines, and sometimes the whole length, are protected by thick curved turtle-back decks, can hardly be said to come under the head of iron-clads, and no detailed account of such vessels will be given, though the Italia, the largest war-ship in the world, deserves mention. Her displacement is 13,480 tons. She has no side-armor, but has a curved deck 3 inches thick, and a number of water-tight compartments filled with cork. Twelve 6-inch guns are carried at a height of 14 feet above the water, and six on the upper deck, while four 100-ton guns, two at each end of an oval 18-inch compound armored citadel, are at a height of 32 feet, 8 inches. The Chicago, Boston, and Atlanta, now building for the United States, have their engines and boilers protected by inclined armor-decks, 1½ inches thick.

The Russian circular iron-clads are interesting, though not particularly successful types of vessels. The Novgorod, 101 feet in diameter, has a displacement of 2500 tons. In the centre is a turret carrying two 28-ton guns. The armor is 11 inches on the sides and turret. She has six screws, and made a speed of 8½ knots with 2270 indicated horse-power.

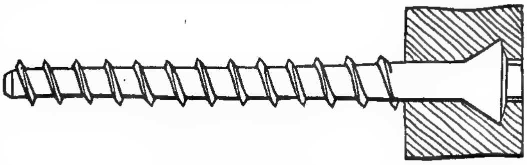
Armor.—A brief sketch of the development and description of the different varieties of armor is all that can be given here. From 1854 till 1858 the limit of thickness was 4½ inches. The welding was not perfect; layers of scoria, scale, steely spots, which broke tools, and other defects, had to be accepted. The earlier plates were very light, and had to be shaped under the hammer, and it was not till rolls were used that real improvement was noticeable, and the thickness of plates began to increase, so that by 1867 good results were got with 8-inch plates.



The First Armor Bolt.

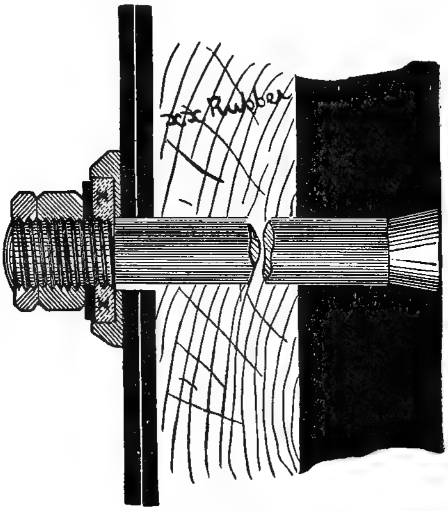
The armor fastenings were ordinary 1½-inch bolts, setting up with an ordinary nut at the inner end, and having a counter-sunk head. They leaked when under water, and were liable to snap at the bottom thread when the plate was struck—the nut flying off with dangerous force.

The French, to get over this evil, used an iron-wood screw, the inner end stopping about two inches short of the inner face of the backing.



French Wood Screw Bolt.

The backing in the Warrior and other iron ships was fastened against an iron skin of plating. In the Bellerophon horizontal girders of half-inch iron secured to the inner skin were introduced, the outer edges stopping about an inch short of the armor. The plates gradually became thicker, the backing deeper, and the girders stouter, till in the Collingwood we find 18-inch plates, backed by 18 inches of teak. The bolt has gradually developed into the bolt shown in the figure, the nut on the inner end being screwed down on a piece of rubber. When compound armor is used the bolt does not pass through, but is tapped into the plate.



Admiralty Bolt.

The armor for the earlier U. S. monitors was laminated; that is, formed by fastening together a number of thin plates till the required thickness was obtained, though as early as 1854 it had been determined that the laminated plate only possessed two-thirds the resisting power of a solid plate of the same thickness.

With the Hercules target the armor passes the gun, but before the ship can be fitted out for her first cruise, guns have been made to pierce it. The platemakers halt at 12 inches, while the guns still call for thicker armor. Plates one over the other will not answer, so sandwich armor is introduced, as in the Inflexible, where the armor was arranged as follows: a 12-inch plate, 11 inches of teak, a second 12-inch plate, six inches of teak with horizontal iron girders, and back of this an inner skin of two 1-inch plates. She was armored in the belief that she was invulnerable, but before she was finished the 100-ton gun at Spezia had proclaimed that the gun was again to the front, and that wrought-iron armor must be abandoned.

Compound armor consists of a plate of wrought-iron faced with steel. In the Cammel plates, made by the

Wilson patent process, the iron plate is heated to a certain degree, placed in a special mould, and molten steel poured in on it to the required thickness. The excess of heat in the steel carbonizes the iron to a depth of from $\frac{1}{8}$ to $\frac{3}{16}$ of an inch, forming a zone of mild steel between the iron and the steel. The plate is then removed from the furnace, rolled to insure a good weld, and the steel face is then tempered and partially reannealled. In the Brown plates, made by the Ellis patent process, plates of iron and steel are placed close together in a mould and molten steel run in between them. The whole is rolled, tempered, and partially reannealed as before. The hard steel face contains as much as .9 of one per cent. of carbon.

The metal for the steel armor-plates is what is known as mild steel, containing as much as .4 of one per cent. of carbon. Schneider uses the Siemens-Martin process. The immense steel ingots from the moulds are forged to shape under the 100-ton hammer. The finished plate is annealed, after the last working, raised to a high heat and tempered with oil, and then again partially reannealed.

The development of steel and compound armor dates back to 1858. The earlier tests were unsatisfactory as compared with iron plates, but at Spezia, in 1876, steel asserted its supremacy. Compound armor took the lead in the development, but the lead has never been great. The Schneider steel plates have not yet been made as hard on the surface as the compound ones, but in case this surface-hardening can be accomplished, it is probable that the armor-plate of the future will be the all-steel plate.

References. For further information on this subject the following works, which have been freely drawn from, should be consulted: *The British Navy,* by Sir Thomas Brassey; *War Ships and Navies of the World,* by Chief-Engineer King, U. S. N.; *The Distribution of Armor in Ships of War,* by W. E. Smith, of the English Admiralty; *The Development of Armor for Naval Use,* by Lieut. E. W. Very, U. S. N. (L. N.)

IRONTON, a city of Ohio, county-seat and chief town of Lawrence county, is on the Ohio River, nearly opposite Ashland, Ky. It is 142 miles S. E. of Cincinnati. It is on the Scioto Valley Railway, and is the terminus of the Iron Railroad and the Dayton and Ironton Railroad, these two roads using the same road-bed for some distance. Ironton is the main business centre of the famous Hanging Rock iron region, which has a splendid local development of spathic iron ore, a carbonate of iron, easily wrought and of high excellence. It occurs in the buhrstone stratum of the lower coal. Coal is mined in the vicinity, but the specialty of the whole region is a charcoal-iron of fine quality, giving employment to numerous furnaces, machine-shops, foundries, and other manufactories. Ironton has churches of the leading denominations, also several banks, schools, and 5 weekly newspapers. It was founded in 1849 and chartered as a city in 1865. Population in 1870, 5686; in 1880, 8857.

IROQUOIS, the name given by the English to a remarkable confederation of Indian tribes, otherwise known in history as the "Five Nations," which, at the period of the settlement of this country, was found in possession of the country to the south of the St. Lawrence and Lake Ontario, from the Hudson to the Genesee River, comprising the greater portion of the present State of New York. Their history is in several respects the most important of that of any of the Indian tribes, and their political organization was unequalled in efficiency and wise adjustment of the relations of the several tribes anywhere in America except in Mexico and Peru. The features of this remarkable organization may be very briefly outlined. In degree of civilization and in their general habits and customs the Iroquois closely approximated to the other tribes, though they perhaps devoted more attention to agriculture. Politically they were far in advance of the other tribes. Their confederacy was a sort of federal republic, to which the different "nations" bore a relation somewhat resembling that which the several States of America bear to the Union. But it was a confederation absolutely free from the one-man power, being in fact a direct expansion of the tribal organization. The Indian tribes were organized on a peculiar family system, being divided into clans presumably made up of blood-relations. Each clan attended to its own private interests, while the elected sachems of the clans were the civil rulers of the tribe, the authority of the chiefs being confined to leadership in war. In the formation of the Iroquois confederacy this principle of organization was strictly adhered to. Fifty permanent sachems were created, they being unequally distributed among the five nations, in accordance with their respective strength. These sachemships were made hereditary, under limited and peculiar laws of descent. The council composed of these 50 sachems, who were strictly equal in rank and authority, formed the supreme ruling body in the confederacy, exercising all legislative and judicial authority. Yet they had only control over questions concerning the confederacy as a whole. The domestic and many of the political concerns of each tribe were managed by that tribe alone, under the control of its own body of sachems. The great council-fire of the confederacy was in the special keeping of the Onondagas, who occupied a central position. It was kept always burning. The meetings of the council were held yearly at this place, though in case of exigency assemblies might be held at other times and other places. During its annual meetings it declared war, concluded peace, made treaties, received embassies, regulated the relations of the subject tribes, and arranged all necessary general affairs of the association. One of the Onondaga sachems was held as specially eminent, and has been called king by some writers, yet he had no actual superior power. The confederacy was a republic with a congress only, and no president. The chiefs, who owed their office to personal valor or ability alone, and were in no sense a hereditary body, were inferior in power to the sachems. Yet as time went on their influence increased, until at the date of dismemberment of the confederacy they had attained a power in many respects equal to that of the sachems. The chiefs were essentially war leaders, a duty never performed by the sachems. But no one man power was permitted, either in military or civil affairs. Expeditions were conducted under the leadership of a body of chiefs, there being no supreme leader. And war service was entirely voluntary. No compulsory service existed, though there was never any lack of volunteers. Such was the powerful organization which from the period of its formation was constantly at war with the surrounding tribes, subjecting one after another to its sway, and which, but for the interference of the whites, might have become supreme over the whole body of Indians east of the Mississippi. This, in fact, it accomplished to some extent in despite of the whites, as a brief glance at its history will show.

Historical.—At the era of Dutch discovery of the Hudson (1609) the Iroquois were found in possession of the region above described, the confederacy then embracing five tribes, afterwards known to the English as the Mohawks, the Oneidas, the Onondagas, the Cayugas, and the Senecas. Of their history previous to this period we know only from their own traditions, which, however, are probably to some extent trustworthy. According to these traditions they originally dwelt north of the St. Lawrence, as a single and small tribe, subject to the Adirondacks, who then controlled all that region. Subsequently they rebelled, and were defeated and driven from the country by the Adirondacks. Descending to the New York region they settled in separate bands, each of which became a tribe. The Mohawk branch settled near

Utica. The Oneidas and Onondagas were at first united, but afterwards separated, the former settling east of Oneida Lake, the latter remaining in the Onondaga Valley. A similar unity existed between the Cayugas and Senecas, who eventually divided, the former settling on the east bank of Cayuga Lake, while the Senecas established themselves at the head of Lake Canandaigua. Hostilities arose between these tribes. The idea of a league originated with the Onondagas. This was formed probably about a century before the Dutch advent, though tradition makes it much earlier. The organization grew actively aggressive. At the period of French settlement in Canada the Iroquois were revengefully attacking their old enemies, the Adirondacks, whom in time they nearly exterminated. At the date of formation of the Dutch post at Orange, now Albany (1615), the Iroquois were populous and powerful, and were rapidly subjecting the tribes of the north-east. Friendship was established between them and the Dutch, which continued unbroken during Dutch occupation. When the English succeeded to the control, in 1664, similar relations were established, and the Indians continued friendly until the end of English dominance by the American Revolution. The case was otherwise with the French. From the date of the expedition of Champlain, in 1609, the Iroquois, influenced by the defeat they had sustained at his hands, continued inveterately hostile. They did much to prevent the extension of French influence in America, and by their aid to the English played an important part in giving the latter the supremacy in this country. The possession of firearms by the Iroquois, which was an immediate consequence of their relations with the whites, gave them at once an immense advantage over the remaining tribes, and throughout the seventeenth century their history is one of constant aggression and conquest. In 1643 they expelled the Neutral nation from the Niagara peninsula, and formed a permanent settlement there. In 1653 they nearly exterminated the Eries, who occupied the region south of Lake Erie to the Genesee. By 1670 they had completely subjected and disposed of the Adirondacks and Hurons, and gained control of the whole country between Lakes Erie, Ontario, and Huron, and of the northern bank of the St. Lawrence to the vicinity of Montreal. They also made constant irruptions upon the Indians of New England, and about 1670 forced them to break up many of their settlements, and flee for safety to the borders of the English colonies. They were no less aggressive westward and southward. In 1680 they attacked the Illinois on the Mississippi, and drove them from the country. At various times, both before and after this date, they attacked the Cherokees on the Tennessee and the Catawbas in South Carolina. Some war parties went still farther, no enterprise being too perilous, no distance too great, no fatique too severe, for their courage and enterprise. By the year 1700 their influence extended from the Atlantic to the Mississippi and from the St. Lawrence to the Tennessee, all the tribes of this region being in dread of or in subjection to their indefatigable foes. Some of the tribes, like the Delawares, they prohibited from engaging in war. Others they compelled to submit to their dictation. But for the advancing dominion of the whites this loosely consolidated savage empire might in time have become a great power in the land.

The hostile relations of the Iroquois with the French culminated in 1688 in a surprise of the settlement on the Island of Montreal, in which, as some writers say, 1000 French perished or were captured. The French in return invaded the Iroquois country and burned their villages, but found it impossible to overtake the active savages. Such invasions took place in 1692 and 1696. A general peace succeeded, which continued till 1755. In the meantime the original Five Nations had been increased to six. In 1715 the Tuscaroras, a tribe closely allied to them, were driven from North Carolina by hostile tribes, and sought a home among the Iroquois, who admitted the tribe as a member of their confederacy. The Six Nations took part in the French and Indian war, 1755–63, but peace was finally established by the conquest of Canada by the English. During the American Revolution the Iroquois took sides with their old allies, the English, and many border outrages occurred, such as the massacres of Wyoming and Cherry Valley. These were followed by an invasion of their country, in 1779, by Gen. Sullivan with 4000 troops. He destroyed their villages, burned their orchards and grain, and nearly broke up the power of the confederacy. With the establishment of peace the history of the Iroquois as a warlike confederacy ended, and the lawless and long-continued irruption of the whites upon their territory began. (See BRANT, JOSEPH, in Vol. I.)

As to the numbers of the Iroquois at the period of their greatest prosperity it is not easy to decide. They are given in different estimates at from 10,000 to 70,000. Morgan's estimate, of 25,000, is probably near the truth. It may seem strange that so small a body could play so important a part in American history, and carry their conquests so far. But it must be remembered that America was very thinly populated by the Indians. Bancroft estimates the whole original population of the United States territory at 180,000. The war party of Iroquois which advanced to the Mississippi and drove out the tribe of Illinois consisted of but 400 warriors. As New York became settled the remnants of the tribes were crowded into small districts, and many of them left the State. During the Revolution the Mohawks emigrated to Canada, where they now occupy two reservations under the British government, one on Grand River and one near Kingston. A part of the Oneida tribe now reside on Thames River, Canada, but about five-sixths of the tribe, 1500 in all, are settled at Green Bay, Wis. Of the Senecas a small party is in the Indian Territory, but the bulk of the tribe is settled on three small reservations in Western New York. The Onondagas still remain in their old location, the beautiful Onondaga Valley. The Cayugas are entirely broken up and scattered among the other tribes. Of the Tuscaroras there are some hundreds at the Grand River Mohawk settlement, and the remainder mingled with the other tribes. The numbers of the Iroquois reached their lowest stage about the date of the war of 1812. They have since been increasing. There are now about 7000 in the United States, and 3000 to 5000 in Canada. Christian missions have been established among them since early in the century, and they are progressing in civilization. In 1850 the Senecas exchanged their tribal organization for a republican form of government, consisting of a president, 18 councillors, and other officers, elected by ballot. They have their own schools, supported by the State, and mainly supplied with native teachers. A teachers' institute, with 15 members, was organized in 1871. An annual agricultural fair has been held for a number of years. As for the linguistic relations of the Iroquois, the Six Nations spoke closely related dialects, allied to those of the Hurons and Wyandots, the whole forming a distinct and separate group of American languages. (See INDIANS, AMERICAN, in ENCYCLOPÆDIA BRITANNICA.) (C. M.)

See Vol. XIII. p. 372 Am. ed. (p. 362 Edin. ed.).

IRRIGATION, the artificial application of the water of streams and wells to cultivated land, in regions of little or of irregular rainfall. This system has been practised in all ages since the establishment of systematic agriculture, and in very many parts of the earth, and the frequent remains of irrigating canals and reservoirs attest the ancient industrial activity of mankind. In ages preceding history the natural irrigation of the Nile was added to by the diligent labor of the Egyptians. Still more extensive irrigating works existed on the ancient Tigris and Euphrates, traces of the canals which conveyed the river waters for hundreds of miles being yet visible, though the country has become again a desert through neglect of these life-giving arteries. The ancient populous condition of South-western Asia was mainly due to irrigation, and its modern depopulation arises from the widespread decay of the old system of agriculture. The soil of Judea was fed with the water of its streams. Damascus was made a garden in the desert by the waters of the Abana and the Pharpar. In Armenia traces of a complete system of prehistoric canals exist, and the hot and dry soil of this country is still made very fertile by the employment of some of these ancient irrigating canals. In Arabia are found relics of huge reservoirs among the hills. In Persia, India, and China irrigation seems to have been very anciently practised. Throughout the Roman empire traces of its employment exist. In fact the idea of applying the water of streams to the land, by means of canals and ditches, seems to have early originated in human history, perhaps instigated by the natural irrigation of the Nile and other streams, with the rich resultant fertility of their overflowed border lands.

In modern times irrigation in the Eastern Hemisphere has been practised with equal diligence and success, though in several regions the land anciently rescued from the desert has been permitted to lapse into its old condition. In Egypt irrigation is practised as actively as of old. In Persia and India the native irrigating works are extensive, and in the latter country the English have greatly widened the area of fertility by costly reservoirs, wells, and canals. In Central Asia the fertile oases derive their fertility mainly from the rivers which traverse them, a large percentage of whose waters is taken to spread over the fields. In Europe the Roman system of irrigation has not been suffered to die out, and has been particularly kept up in Northern Italy, where the waters of the Po and other streams are largely applied to the land. The art was practised by the Arabs in Spain and Northern Africa, and is still kept up in these regions and to a considerable extent in France, in the Turkish empire, and elsewhere in the Mediterranean region. Its revival in England has been quite recent. There, as in all regions where rain falls in some abundance, it is used almost entirely for grass crops and meadows.

As to the date in which irrigation was first practised in America we are as ignorant as in regard to the like problem in the Eastern Continent, but its ancient employment in the empire of Peru seems to have been on a more magnificent scale than anywhere else on the earth. This country, in great part a rainless desert, was made populous and highly fertile by the artificial application to its fields of the mountain waters, and among its many massive ruins not the least in extent and importance are those relating to irrigation. Squier describes existing remains of vast irrigating works, consisting of huge reservoirs in the valleys of the hills, fed by canals that in some cases ran hundreds of miles through the mountains, here with high walls of masonry, here cut or tunnelled through the rocks, here carried over embankments 50 or 60 feet high. To feed these the streams were dammed, and the hills scarped or terraced, so that scarcely a drop of water from the rains or melting snows was lost. In the valley of the Nepeña a great reservoir three-quarters of a mile long and half a mile wide was formed by a massive stone wall across a gorge between two hills, the wall being 80 feet thick at the base. Prescott describes canals and subterranean aqueducts, constructed of large slabs of freestone fitted without cement, one of which, in the district of Condesuyu, was between 400 and 500 miles long. This system was extensively used even in the region where rain falls six months of the year, but its most important use was in the rainless coast region, where the practice of irrigation has been resumed by the present inhabitants, though the magnificent works of the Incas have been permitted to sink into ruin.

In North America irrigation seems to have been practised to some extent by the Aztecs, and probably by the Indians of the dry regions to the north of Mexico. The Spanish inhabitants of New Mexico and California employed it to some small extent, but it was left for the people of the United States to give it a great development in these regions. In this country irrigation on an extensive scale has only very recently come into existence, and this only in the districts of Colorado, Southern California, and Utah, where the climatic conditions are such as to render it indispensable. In the Eastern United States its only important employment is in the rice-fields of South Carolina and Georgia, though it is practised to a small extent for some other crops, such as the cranberry.

The mountain-girdled State of Colorado would be nearly uninhabitable, from lack of rain, but for its many streams, whose waters flow through valleys capable of great fertility. Some degree of irrigation is practised in all the river valleys, but most extensively in those of the Grand and the Rio Grande. The broad spread of San Luis Park offers opportunities for a rich agricultural future of this region, but until recently little had been done beyond occupying the old Mexican ranches, with their irrigating ditches, bordering the Rio Grande and its tributaries. Enterprise has now awakened in this region, and it is said that one company has considerably over 100 miles of irrigating canals already constructed at a cost of $750,000. In the valley of the Grand and its tributaries, the Gunnison and the Uncompahgre, the large mining population has stimulated irrigation. The "Grand River Ditch," the most extensive enterprise there projected, is 35 feet wide at bottom and 50 feet at top, with a water depth of 5 feet for its first 10 miles, its total length being 25 miles. It has a flow of 2 miles per hour, and a delivery capacity of 700 cubic feet per second. The total appropriation of water to agriculture in Colorado, according to a recent statement of the State engineers, amounts to 43,456 cubic feet per second, with a ditch capacity sufficient to irrigate 2,000,000 acres. One cubic foot per second will irrigate 50 acres at an estimated cost of $750, making the total value of these works $30,000,000. In Colorado water is of more value than land.

In Utah the Mormons found a barren wilderness and have made it a highly productive farming region by a most skilfully devised system of irrigation, the water of the hill regions being everywhere conducted to the fields. In California irrigation is mainly confined to the southern half of the State, though practised to some extent in the north. Here no rain falls in the summer months, and the ground becomes dry and parched. In the valley of the San Joaquin and its tributaries, embracing about 10,000,000 acres of good soil, the rainfall is so insufficient that much of the valley looks like a desert. Only a small part of its water supply is yet utilized, there being something over 200,000 acres irrigated. In the great and dry southern counties of San Bernardino, San Diego, and Los Angeles the water supply is very limited. In this region over 500 miles of ditches had been completed in 1879, watering about 65,000 acres. In other counties of the State about 75,000 acres are under irrigation. All this, however, takes but a small portion of the water supply, and irrigation is being steadily extended and will yet be spread over a much larger extent of land surface. The water supply is very easily and cheaply obtained from the streams and from artesian wells which can be sunk almost anywhere in the valleys at comparatively little expense. The windmill is universally employed to pump water from these wells. The total cost of irrigating works in this State is from $15 to $30 per acre, and as the water can be sold at a cost of about $1.25 per acre for each crop and greatly adds to the fertility of the land, there is every inducement to a great increase of irrigating facilities.

The methods of irrigating differ considerably in different localities and must depend in some measure on the extent of rainfall and the quantity of extra water needed. In Europe the depth of water annually supplied to ordinary field-crops averages from 20 to 40 inches. But for the growth of the semi-aquatic rice a much greater quantity is needed. The expense of irrigating ditches depends largely on the degree of elevation of the region. Where the arable soil slopes upward above the river-level dams or weirs are needed, creating reservoirs of outflow, the expense of these works rapidly increasing as the land to be reached grows more elevated. In delta regions, on the contrary, or wherever the land lies at or below the level of the water surface, irrigation becomes cheap and easy, and it is to regions of this character that we must look for all early applications of the art. Such is the case in Egypt, Babylonia, India, Central Asia, and in most localities in which irrigation has been practised from an early date. In a region of annual overflow, like that of the Nile, nature in great measure saves the work of man. But in most regions an extensive and occasionally very costly system of canalling is requisite. Such is the case in most of the American irrigating processes, though in California the extensive works for the use of the water of the mountain streams in mining have proved of value to agriculture. In irrigated regions the water is usually conveyed by a main canal from the stream to the cultivated region. Secondary ditches lead from this, and these in their turn supply the irrigating trenches, or furrows, which cross the fields at a distance of about 40 yards apart. The supply is regulated by sluices, by whose aid the water can be uniformly distributed, and the quantity given to any plantation can be estimated. In India the slope of the Ganges Canal averages 15 inches to the mile. In many canals it is less. The main canal of the San Joaquin Valley of California has a fall of 1 foot to the mile. The fall of the ditches is much more than this. In all systems of irrigation it is very important that the water thus applied to the fields should be removed again, either by the aid of a porous subsoil or other condition of natural drainage, or by the use of artificial drains. Otherwise the water will stagnate beneath the soil and prove injurious to the plants. Irrigation, in fact, is by no means wholly valuable, particularly in the ordinary methods of its application. It has serviceable features, and in many regions is indispensable, yet the frequent lack of caution and judgment in its use tends to reduce its value and may make it positively injurious. Some consideration of this point is here necessary.

The value of the artificial application of water to cultivated land, even in regions of a fair amount of rainfall, will be generally admitted when we consider the evil effects that frequently arise from drought at the seasons when rain is particularly needed. Yet it has other values no less evident than this. River water often carries great quantities of fertilizing matter in solution, and by depositing this on the soil it obviates the need and saves the expense of manuring. Yet this is not always the case, and where well water is applied to the land, and in some cases even with river water, hurtful salts may be held in solution which cause positive injury to the soil. In addition to the vegetable and mineral matter held in solution air and other gases are absorbed and carried into the soil by the subsiding waters, yielding a beneficial effect. In certain cases of soils impregnated with salts to an injurious degree they have been rendered fertile by irrigation, the salts being dissolved and removed by the percolating water. The immediate effect of the application of water is to soften the soil and render it more penetrable to the plow and the roots of plants. It is, in fact, frequently applied before plowing to the extent of 400 or 500 cubic yards per acre, in order to soften the earth to the depth of about a foot. Yet the effect of a long-continued application of water is to harden the soil. The best of all soils for irrigation are those light enough to let the water quickly sink to a lower stratum. Yet clayey soil may be successfully irrigated if underdrained. In addition to the beneficial effects of irrigation above mentioned may be named its utility in the drowning out of injurious insects and rodents.

Until recently the increase in size of products arising from irrigation has been looked upon as a positive advantage, but a closer observation has led to a somewhat different conclusion. It now appears that while the bulk is increased the quality is often injured, and that the flavor and the nutritive value of the products of irrigated land fall below those of unwatered plants. In the growth of trees, however, the effect is solely beneficial, the wood being rather improved than injured, while its growth is quickened. The ditching and terracing incident to irrigation have much increased the growth of trees on hill-sides, and the lost forest growth of hills, which has become so serious an evil in many localities, is being in some regions replaced by this method, the water being forced to descend slowly, to deposit soil, and to permeate the ground. The various evil effects of irrigation which we have mentioned are none of them necessary accompaniments of the art. They could all be avoided by a study of the character and needs of the soil and the crop, and a judicious moderation in the use of the water, and also by making quality rather than weight the standard to be attained in the growth of crops. (C. M.)

IRVING, JOHN HENRY BRODRIBB, known as HENRY IRVING, an English actor, was born at Keinton, near Glastonbury, Feb. 6, 1838. His early life was spent in London but he made his first appearance on the stage at the Sunderland Theatre, Sept. 29, 1856, as Orleans in *Richelieu*. After two years and a half in the Theatre Royal, Edinburgh, he first appeared before a London, audience at the Princess' Theatre, in 1859, but continued to play chiefly in other places. His success at Manchester, especially as Scudamore in Dion Boucicault's play *Hunted Down*, led to an engagement at the St. James' Theatre, London, in October, 1866. Appeared first as Doricourt in *The Belle's Stratagem*, then as Scudamore, and afterwards in the portraiture of villany in all its forms; later he turned to refined comedy and steadily won success. In May, 1870, he went to the Vaudeville Theatre, where for 300 consecutive nights he appeared as Digby Grant in Albery's comedy, *Two Roses*. He also had remarkable success in 1871 as Mathias in *The Bells*, founded on Erckmann-Chatrian's *Polish Jew*. His appearance as Eugene Aram and as Richelieu, both in 1873, fully established his reputation for thorough study and artistic delineation of nearly every phase of character. Irving in October, 1874, essayed to give to the world his conception of Hamlet. It called forth abundant criticism both favorable and adverse. Proceeding in his study of Shakespeare Irving added to his rôles Macbeth, Othello, Richard III., and Shylock, and he had long before appeared as Petruchio in *The Taming of the Shrew*. Of later plays in which he has appeared may be mentioned Tennyson's *Queen Mary*, in which he played Philip of Spain, and especially Boucicault's adaptation of Delavigne's *Louis XI*. After rising to the foremost place on the British stage, Irving in 1883 came to America, visiting the principal cities and giving ample illustration of his abundant merits as an actor and stage manager. He was well supported by Miss Ellen Terry.

Irving's success is due not merely to his faithful study of the characters he represents but to his taking each play as a whole, and insisting on all his fellow-actors contributing in their respective parts to the effect aimed at. Therefore he takes infinite pains to train each member of his company to understand and to express the part assigned him. Irving's ideal is high, but his ability in getting others to help him to express it is as wonderful as his own artistic skill in rendering the prominent characters.

IRVING, THEODORE (1809–1880), an American clergyman and author, was born at New York, May 9,

1808. He was a nephew of Washington Irving (for whom see the Encyclopædia Britannica). After a course of study at Columbia College he went in 1828 to Spain to be secretary to his uncle, then attached to the U. S. legation at Madrid. He afterwards went to London and Paris, and in 1836 he was made professor of history and belles-lettres in Geneva (now Hobart) College, N. Y. He held a similar position in the Free Academy of New York, 1848–52. He took orders in the Protestant Episcopal Church in 1854, and became rector of Christ Church, Bay Ridge, L. I. He was afterwards rector of churches on Staten Island, and for several years was rector of St. John's School for Girls in New York. He died Dec. 20, 1880. He published *Conquest of Florida by Hernando de Soto* (1835; new ed., 1857); *Fountain of Living Waters* (1854); *Tiny Footfall* (1869); and *More than Conqueror* (1873).

IRWIN, Jared (1750–1818), an American statesman, was born in Mecklenburg co., N. C., in 1750. His parents removed to Georgia in 1757 and Jared was brought up on the Indian frontier. During the latter part of the Revolutionary war he was actively employed against the Tories and Indians. At the close of the war he was elected to the State legislature. He was a member of the convention which ratified the U. S. Constitution in 1789 and was president of the State Constitutional Convention in 1798. He was governor of the State in 1796–98 and again in 1806–09. While holding this office in 1796 he signed the act abrogating the grant of Yazoo lands made by the legislature in the previous year. Having removed to Pennsylvania, he was elected to Congress in 1813 and served two terms. He died at Union, Washington co., Ga., March 1, 1818.

See Vol. XIII. p. 388 Am. ed. (p. 377 Edin. ed.).

ISAIAH. Respecting the life and times of the prophet Isaiah, see the article on Israel. The Book of Isaiah, as it now stands, is commonly regarded as consisting of two parts. The first of the two parts resolves itself into five divisions, so that the whole book is divided as follows: 1. The introduction, chapter i.; 2. A group of discourses connected with historical events, ending with a song, chapters ii.–xii.; 3. A book of "burdens" on Babylon, Philistia, Moab, Damascus, etc., chapters xiii.–xxiii.; 4. Another group of discourses, dealing mainly with some tremendous calamity for both Ephraim and Judah, in contrast with statements respecting a king who shall reign in righteousness, this division also ending with a song, chapters xxiv.–xxxv.; 5. Account of Sennacherib's invasion and Hezekiah's sickness, chapters xxxvi.–xxxix.; 6. The second part of the book, a collection of highly poetical prophecies in three sections, each including three times three pieces, so arranged as to form a literary unity, though they differ much among themselves. The state of things implied in the introductory chapter is very closely the same with that which the historical books attribute to the reign of Manasseh. The order of arrangement among the remaining parts is mainly chronological so far as the nature of the parts arranged will admit, this exception being quite important.

That the book is composite, having been edited from previously existing materials, either by the original author of the prophecies or by some one else, need not be disputed. The opinion commonly received is that the prophecies were all uttered by the Isaiah who lived in Hezekiah's time, and that they were both written and edited by him or his contemporaries. The view taken in the Encyclopædia Britannica seems to be that Isaiah wrote the first and second of the parts just mentioned, except, perhaps, chapter xii., and that he wrote some portions of the third, fourth, and fifth divisions, and, possibly, one or two of the short pieces which have been incorporated into the sixth division. The remaining parts it holds to have been produced at various dates, some of them as late as the times of Nehemiah.

If there were really sufficient proof that this view is correct it would not change the fact that the Book of Isaiah, in its present shape, and bearing its present title, was in existence in the times of Jesus, and was, beyond dispute, a part of the Scriptures which he and his opponents alike recognized as divinely inspired. Were this view to prevail it would affect the doctrine of inspiration only in certain relatively unimportant details. The questions in hand are mere questions of fact: there is no reason why the contestants on either side should make them matters of theological prejudice.

The Jewish tradition summed up in the *Baba Batra* is that Isaiah wrote his own book. This was the opinion of the Christian Fathers, and of the earlier writer, Josephus. In the second or third century B. C. the septuagint translators found our present book of Isaiah in existence. The Hebrew author of Ecclesiasticus, as early as about 200 B. C., attributed to the Isaiah of Hezekiah's time several of the passages now in dispute, Ecclus. xlviii. 17–24. It is easy to assert that the title in Isa. i. 1 is not original, and not authoritative, but less easy to prove the assertion. The eminent author of the article referred to agrees with all other trustworthy critics in noticing that the disputed portions of the book have many important points of contact with those which are undisputed, in the way of peculiarities of vocabulary, syntax, and style. These and many other arguments for the unity of the book are too weighty to be blown away by a breath.

On the other hand the principal disputed parts of Isaiah are writings of such a character that they attracted the attention of the New Testament authors more than any other part of the Old Testament. We may be sure that the men of the New Testament were not alone in this. And if the later prophets and the scribes who succeeded them were earnest students of these writings, their own vocabulary and style is likely to have been affected thereby. This circumstance greatly weakens all arguments from phenomena of this sort for proving the late origin of these parts of Isaiah.

The traditional interpretation of the book of Isaiah, and consequently the traditional defence of it, have been too much influenced by the assumption that prophecy and prediction are convertible terms. Interpreters have been attracted by the idea that Isaiah, a century and a half beforehand, drew pictures of the condition of things in the days of Cyrus, and have been led by this to find meanings here which they would otherwise scarcely have found. Many hold, for example, that Isa. xl.–xliv. 23 refers to Israel in exile in Babylonia, oblivious of the fact that these chapters constantly present Israel as dwelling in Jerusalem and the cities of Judah, that the geographical details with which they abound are purely Palestinian, and that they do not mention the exile. We are therefore the less entitled to find fault when those who attack the received views plant themselves upon this same supposed Babylonian cast of the book. But the fact is that, with the exception of a very few detached passages, the most conspicuous of these passages being the prophecy concerning Cyrus (beginning Isa. xliv. 24), the book of Isaiah throughout assumes that the Jews were living in their own country when it was written. All the coloring is thoroughly pre-exilio.

The author of the article in the Britannica happily records the fact that the Assyrian records throw great light upon parts of Isaiah. He especially notes that chapters xx. and xxi. 1–10, which many critics were formerly most confident in pronouncing to be of late origin, are shown by the Assyrian records to have the marks of contemporaneous writings. The military operations in Elam and Media, mentioned in chapter xxi., are those of the times of Sargon or Sennacherib, and not of the times of Cyrus. The same fact appears in many instances additional to those mentioned by our author. Sennacherib says, for example, that in the year after his great campaign in Judea he invaded

Babylonia, and the Babylonians fled in ships, and carried off their gods with them. If Isa. xliii. 14 and Isa. xlvi. 1, 2 be understood as allusions to this circumstance, their meaning is made perfectly clear. In Isa. xlvii. 1–3 the picture of the daughter of Babylon going into exile is a true picture of what happened in the reigns of Sargon and Sennacherib, while it hardly agrees with anything of which we have knowledge, the policy of the Persian monarchs, or their treatment of Babylon. Similar instances are well known.

In the times of Isaiah Babylonia sustained three distinct and dissimilar relations to Judah. When Merodach-Baladan was hard pressed by Assyria, he sought alliance with Judah as he did with other peoples. In these circumstances Isaiah had occasion to denounce Babylon by way of opposing the alliance, and insisting that Israel should rely upon Jehovah alone. Again, Tiglath Pilezer, Sargon, and Sennacherib carried off Israelite and Judaite exiles, and settled them in the Babylonian regions. How were these foreigners regarded and treated when Merodach-Baladan was in power? It certainly involves no absurdity to suppose that Isa. xlvii. 6 is an answer to this question, instead of being an allusion to what occurred in the days of Nebuchadnezzar. And still again, Tiglath Pilezer for the last five years of his reign ruled Babylonia as well as Assyria. Sargon did the same the last five years of his reign. Sennacherib was king of Babylon nearly from the beginning of his reign, and Esar Haddon throughout his reign. It was to Babylon and not to Nineveh that the last-named king took Manasseh captive, 2 Chron. xxxiii. 11. References to Babylon as a political power oppressing Israel do not of necessity indicate the times of Nebuchadnezzar, or later. There was abundant opportunity for them within the probable lifetime of Hezekiah's counsellor, Isaiah.

The very marked differences in linguistic and literary character between the different parts of the book are not so strong an argument against unity of authorship as they would be if the work were a monograph, instead of being a selection from the productions of a lifetime. And even if it were conceded that these differences prove diversity of authorship, that would not prove the late date of any part of the book.

If the whole book was written in the times of the original Isaiah, then it contains some marked instances of the specific prediction of future events. The period when it was written was a period of interested study of the Pentateuch, especially of the parts recounting the creation, the call of Abraham, and the beginnings of the history of Israel, for much of the book is full of allusions to these things. It follows that a scholar who holds that these parts of the Pentateuch were written after the exile, or one who disbelieves in the reality of supernatural prediction, must, of course, hold to the post-exilic production of large parts of Isaiah. Most scholars who deny these two premises will also deny this conclusion. (W. J. B.)

ISHPEMING, a city of Michigan, is in Marquette county (Lake Superior region), 392 miles N. of Chicago by the Chicago and North-western Railway. It is also on the Marquette and Western and Marquette, Houghton, and Ontonagon Railroads. The city of Marquette is on Lake Superior, 15 miles E. of Ishpeming. The main business of the town is the mining and shipment by rail of iron ore. There are several churches, hotels, banks, and newspapers. Ishpeming has 2 blast-furnaces, besides foundries, machine-shops, and other manufactories. The population includes a large element of Scandinavian birth. The mines are wrought principally in open quarries, in much the same way as some of the great Swedish mines are operated. The ore is a red hematite, and is found in immense veins or lodes. The population of the city in 1880 was 6039.

ISMAIL PASHA, ex-khedive of Egypt, was born at Cairo in 1830. He was the second son of Ibrahim Pasha and a grandson of the celebrated Mehemet Ali. Educated at Paris he returned to Egypt in 1849 after his father's death, and was active in the princes' party, which opposed Abbas Pasha, the new viceroy. Said Pasha, having succeeded on the death of Abbas in 1856, employed Ismail in missions to European courts, and afterwards made him a member of the council of state. In 1862, when Said Pasha visited Europe, Ismail had charge of the administration. In the same year, as general-in-chief of the Egyptian army, he was successful in repressing the disturbances in the Soudan. Said Pasha having died Jan. 18, 1863, Ismail succeeded as viceroy without opposition. The extraordinary increase of the culture of cotton, due to the American civil war, brought a sudden flow of wealth to Egypt; but the withdrawal of the fellahin from labor on the Suez Canal caused difficulties with Count de Lesseps. These being settled by the arbitration of Napoleon III. in 1864, Ismail zealously promoted this great international work. His wealth enabled him to obtain from the sultan in 1866 the privilege of succession in direct line for his dynasty, although contrary to the Mohammedan custom. Further concessions were granted on account of his assistance in subduing the Cretan insurrection. The internal administration of Egypt was freed from Turkish supervision, and the title of khedive was conferred on its ruler. But Ismail's demands increased, and only foreign intervention induced him to refrain from renouncing his allegiance to the sultan. European manners and customs were introduced, and Alexandria and Cairo took on the aspect of Paris. On Nov. 25, 1866, he opened the first Egyptian parliament, which occupied itself chiefly with questions of taxation, judicial administration, and irrigation. The khedive, keeping in his own hands the more important powers, pushed his conquests in the valley of the Nile, and, with the aid of Sir Samuel W. Baker, over the White Nile Region. When the Suez Canal was approaching completion, Ismail took part in the ceremonies connected with the admission of the waters of the Mediterranean into the Bitter Lakes, March 18, 1869, and he visited several of the courts of Europe to invite their sovereigns to the opening of the canal, Nov. 17, 1869. The sultan resenting his show of independence commanded him to reduce his army and to discontinue contracting loans in Europe, and Ismail, getting no support from the Christian powers, again submitted; but by liberal largesses to the Turkish court he obtained in 1873 complete control of his army and the right to negotiate loans at pleasure. The European policy which he pursued necessitated the employment of many foreigners, and, notwithstanding the rapid superficial development of the country, a public debt of more than $400,000,000 was incurred. In 1875 temporary relief was obtained by his selling to the British government his shares in the Suez Canal for £4,000,000. Mr. Stephen Cave was then sent to examine the financial condition of the country; but though an investigation was made no action was taken. In 1876, when payment of interest on the Egyptian bonds was suspended, Mr. G. J. Goschen and M. Joubert were sent as representatives of the French and English bondholders to attempt an adjustment of the finances. They had but little success in their object, but a European board of control was established, and the khedive's estates were relinquished to the creditors. The financial difficulties were complicated by the discontent in the army and among the people, who resented the intrusion of the foreigners. At last, in 1879, the representatives of the leading European powers induced the sultan to demand the khedive's resignation. On June 26, 1879, he abdicated in favor of his son, Tewfik Pasha, and on July 1 he left Egypt for Naples, where he established himself in luxurious retirement. He has seven sons and five daughters.

See Vol. XIII. p. 406 Am. ed. (p. 396 Edin. ed.).

ISRAEL. The main source of information for the History of Israel, up to the times of Nehemiah, is the Old Testament; up to the times of Ahab, this is practically the only source. The question how we are to deal with these writings, as a source of information, is therefore of prime importance. Most of the scholars who hold to the inspiration of the Bible are yet content to regard the question of its historical credibility as one which should be discussed antecedently to the question of inspiration; and therefore, to make its historical trustworthiness one of the premises of the doctrine of inspiration, instead of basing the former upon inspiration. Thus far, a large majority of evangelical scholars, though not all, would agree with scholars of the opposite school, as to the proper point of departure in an investigation of this kind.

But suppose we are agreed, at the outset, to regard these writings merely as ancient documents which have been handed down to us, and whose value we must determine mainly from their internal characteristics; how ought we to treat them? Any person familiar with the Old Testament, glancing over the article in the ENCYCLOPÆDIA BRITANNICA, will see at once that the account given there is very different from that given in our common Bibles. The author of that article would not dispute this statement. Regarding our Scriptures, in their present form, as historically untrustworthy, he has subjected them to a sifting process, pulling the present books to pieces, rearranging them, dropping, in the process, a majority of all the statements they make, as unworthy of confidence, modifying most of those that remain, and supplying the gaps thus made in the history by statements made from conjecture, or from knowledge of general principles. The men of his school would not, of course, deny that this is the process by which his results have been reached; they would defend him by affirming that the process is justifiable, in view of the character of the records. They would not claim, indeed, that the statements he makes are true to actual fact, but only that the actual facts were something like what he states them to have been, and that this is the best we can do in the circumstances.

This is not a true historical method. The case would be somewhat different if there were any rearrangement of the Biblical documents on which, as a whole, some considerable number of eminent scholars were agreed. In that case, the question would be open whether we ought to start in our investigations from the new arrangement, or from the Bible in the traditional form in which we have received it; as the case stands, this is not even an open question; the traditional form of these writings, within the limits of variation presented by the Hebrew copies and the various translations, is the only form in which they are accessible as historical sources. Any man who supposes that he can put them into a truer form is at liberty to use his hypothesis for his own purposes; but he has no right to expect the public to abandon all other evidence and accept his hypothesis as the true basis of investigation.

And if we are to start from the writings in the form in which we have them, we should begin by a direct examination, not by a cross-examination. We should test their statements, certainly, but understanding them is an essential preliminary to testing them. If, on understanding them, we find them consistent throughout, we need go no further; on that supposition, they have a distinct claim to be received as authenticated fact, subject to whatever modifications may be required because of other facts equally well authenticated. If, on understanding them, we find them inconsistent, we shall then be prepared intelligently to inquire after the real facts in the case; but clearly the first step is to understand the accounts. This first step we will attempt to take in the present article, answering the question: What is the history of Israel as related in the Old Testament?

Four Periods.—The Old Testament, as a source of historical information, is to be classified in four divisions. First come the Books of the Hexateuch, treating of the period of *The Establishment of Israel's Sanctuary*, extending to the time of the settlement in Palestine. Second comes the Book (or books) of Judges, Ruth, and First and Second Samuel, with other literature belonging to the same period, notably the Psalms that are assigned to David, treating of the period of *The Wandering Sanctuary*, reaching to the time of the death of King David. Then comes the Book of First and Second Kings, with other books, especially Isaiah, Jeremiah, most of the Minor Prophets, many Psalms, Proverbs, Canticles, and probably Job, treating of or belonging to the period of *The Sanctuary of the First Temple.* Finally, we have the Book (or books) of First and Second Chronicles, Ezra, and Nehemiah, with Ezekiel, Daniel, Esther, some Psalms, probably Ecclesiastes, and several of the Minor Prophets, reviewing the previous history, and treating of the period of *The Sanctuary after the Burning of Solomon's Temple.* This original division is probably the most natural and the best for any subsequent historian to follow.

Traditional Misunderstandings.—The greatest difficulty we shall find in our path will be our habit of mistaking traditional interpretations of the Bible for the statements of the Bible itself. The term "traditional" is here used advisedly, for we are all more or less bound by tradition; in a multitude of instances, the so-called natural meaning is simply the meaning to which habit has accustomed us. Within the present half century, immense recoveries of knowledge have been made, both in the lexicon and the grammar of the Hebrew language, and in the topography, the geography, the history, and the archæology of the countries mentioned in the Bible. We ought to expect that the traditional understanding of the Bible, established through the centuries by men who had not these advantages, would be faulty in many points of detail; and such an expectation will not be disappointed. In fact, an immense proportion of the difficulties which lead men to doubt the historical character of these records, are difficulties which pertain to the traditional interpretation of them, and not to the actual statements of the records themselves. These conditions demand that we pay especial regard to one in particular of the principles of evidence which apply in such cases. When a passage in its commonly accepted meaning is found to contradict other passages, or facts otherwise known, the proper course of procedure is to begin, not by throwing away one or both of the apparently conflicting parts of the evidence, but by inquiring whether they can fairly be understood as so limiting one another that both may be accepted. The moment we begin to study the history we begin to apply this rule, and we apply it throughout.

I. *First Period. From Abraham to Joshua. The Establishment of Israel's Sanctuary.*

According to the Bible, the distinctive history of Israel begins, not with Moses but with Abraham. The account is that Abraham and Lot came into Palestine at the head of a somewhat numerous tribe (Gen. xii. 5). They brought with them all the souls they had acquired in Haran. The importance of Abraham's tribe greatly increased when he returned from Egypt (Gen. xii. 16 and xiii. 2). When Lot was captured in Sodom and carried captive, Abraham was able, from only a portion of his followers, to raise a rescuing party of 318 men (Gen. xiv. 14). He was regarded as a great prince by his Hittite neighbors (Gen. xxiii. 6). It is represented that the clan continued to increase under Isaac (Gen. xxvi. 13, 14). Jacob brought back from Padan-Aram a new following, evidently quite numerous, which he had raised there (Gen. xxx. 43 and xxxii. 5, 7, etc.). It is nowhere mentioned that they suffered reverses or diminished in numbers. Indeed, long before the death of Isaac, Esau and Jacob were obliged to separate widely on account of the numbers of their followers and cattle (Gen. xxxvi. 7).

The Bible does not represent that men lived to the age of several hundred years before the flood, then fell off to one or two hundred years during the times of the patriarchs and the exodus, and afterwards to seventy years or thereabouts. On the contrary, it represents that Abraham was very old at one hundred years of age (Gen. xvii. 17), and Jacob wonderfully old at a hundred and thirty (Gen. xlvii. 8, 9); that it was remarkable that Caleb should retain his vigor at the age of eighty-five (Josh. xiv. 10, 11), and marvellous that Moses should live, a strong man, to a hundred and twenty (Deut. xxxiv. 7); that twenty years was the proper age for military service (Num. i. 3, etc.), and thirty years the proper age for entering upon the graver duties of the priestly office, and fifty the age for retiring therefrom (Num. iv. 3, etc.; also Lev. xxvii. 3, 7); that Joseph at seventeen years (Gen. xxxvii. 2), or a very little older, was mature enough to carry large responsibilities. The idea that the Bible represents human life to have been longer then than at present arises from a mistaken understanding of a representation which it actually makes, namely, that the stock of Abraham was a stock of men of very unusual longevity, vigor, and ability. Jacob and Joseph, working their way to success and fortune, illustrate this. Esau married Hittite and Ishmaelite wives, withdrew from the camp of his father, and, when Jacob came from Padan-Aram, had come to be at the head of a following from which he could raise four hundred men for an expedition (Gen. xxxiii. 1). The really natural understanding of the accounts in Genesis is not that all Edomites were lineal descendants of Esau and all Ishmaelites lineal descendants of Ishmael, and so on, but that each of these sons or grandsons or other relatives of Abraham was a man of ability and power of purpose, who succeeded either in founding a new clan or in placing himself at the head of an old clan, thus giving his name to a people and their descendants.

Genealogy.—From considerations like these it appears that there is no difficulty in regarding the statements made concerning Hagar, Ishmael, Moab, Ammon, Esau, Midian, and others as literally true, or in regarding these as the names of actually existing persons. Certainly the genealogies given in the Bible are not complete lists of pedigrees. Men who assign this character to them either speak without due examination or else allow themselves some latitude of expression. It may also be conceded that we do not entirely understand the principles on which the genealogical tables are constructed; but, on the other hand, there is no need of supposing that they are a mere artificial way of describing the relations of certain groups of affiliated peoples. From the time when Abraham left Ur of the Chaldees he was continually among Semitic peoples. His family, his slaves, his followers, and his neighbors were mostly of like race. There is nothing at all incredible in the representation that his race had sufficient vigor, he himself sufficient resources and influence, and his descendants and relatives sufficient ability, for the establishing of their names, their authority, and some of their family traditions among half a dozen or more related peoples in the vicinity of Palestine.

The current understanding of the account in Genesis has been, at least until very lately, that the six years during which Jacob served Laban for cattle followed immediately upon the fourteen years which he served for his two wives, and therefore that Jacob was some seventy-six years old when he went to Padan-Aram and fell in love with Rachel. But the accounts in Genesis do not affirm this, and many absurd conclusions follow from it; for example, the conclusion that Leah must have had seven children, none of them twins, within about six years, besides a long interval when she was not bearing children (Gen. xxix. 35, etc.). It must therefore be held that a considerable interval occurred between the fourteen years and the six years, that Jacob was very much younger than seventy-six when he left Palestine, that Leah's children were mostly grown men and women when he returned to Canaan, that the taking of Shechem by Simeon and Levi (Gen. xxxiv.)—with the help, doubtless, of a force collected from their father's followers—may well have occurred in the order in which it is mentioned in the narrative, and that Joseph's brothers were the young and middle-aged men we commonly picture them to be when Joseph was seventeen (Gen. xxxvii.), and not mere boys from one to six years older than he.

These accounts say that wives for Isaac and Jacob were sought in Padan-Aram; but they also say that Judah and Simeon, at least, formed alliances with Canaanitish women, and that the children of these alliances were counted among those who went into Egypt with Jacob (Gen. xxxviii., xlvi. 10, 12). They further inform us that all Abraham's servants, whether bought or home-born, entered with him and his children into the covenant of circumcision with Jehovah (Gen. xvii. 13, 23), and that the custom of incorporating men into Israel by circumcision was in existence when they left Egypt and became a part of the Mosaic legislation (Ex. xii. 48, Num. ix. 14).

Israel in Egypt.—From all these considerations it follows that the seventy (Gen. xlvi., etc.) who are mentioned as accompanying Jacob into Egypt were the seventy men and women who, for some reason, had a right to be recorded in the genealogical lists, while the whole number of the covenant people who went with them was probably many thousands, with customs which provided for increase by adoptions into Israel as well as by births within Israel. This is not the traditional understanding of the account, but it is the inevitable meaning of the account itself if we accept the whole of it as historical. With this understanding of the matter, no further explanation is needed of the largeness of the number who left Egypt in the exodus.

Exodus.—The accounts tell us that the Israelites in Egypt had their own country, the land of Goshen, but also that they inhabited it, not exclusively but along with the Egyptians. They had, in general, Egyptian neighbors from whom to demand gold, silver, and jewels when they went out of Egypt (Ex. iii. 22, etc.); the destroying angel, going from one Egyptian house to another, is figured as skipping the blood-sprinkled houses of the Israelites, which he passes by the way (Ex. xii. 13, etc.). But two millions of people, living largely by pasturage, along with other inhabitants in the same regions, must have been spread over some thousands of square miles of territory. If these people were in their houses one night, and started to leave the country the next day (Ex. xii. 39, etc.), they started in many different directions, from an immense number of different points, some of them many days' journey apart. If the account given is historical, then the writer of it had this condition of things in mind, but avoided burdening his narrative with details, and confined himself to describing what passed at headquarters. If we allow our imaginations to undertake to supply the missing details, this should be done in accordance with what we know of the topography of the country and of the circumstances naturally attendant upon the moving of so vast a body of people. If these people, 2,000,000 strong, marched from the traditional Sinai to Kadesh, they did not move through those tremendous narrow defiles, always formed in four great bodies, with the ark in a hollow square in their midst (Num. ii., iv.); they moved and encamped as the nature of the ground permitted. The writer of the account, if he was writing history, knew the nature of the country through which they passed, and intended to be understood accordingly. The idea that many persons have of his description of the four encampments is an absurdity; but the description is capable of being understood in a perfectly rational meaning.

The Wilderness.—The narratives inform us that, during the forty years in the wilderness, Jehovah sometimes met the needs of Israel by a wonderful supply of quails (Num. xi. 31, etc.), and that he fed them with manna as they needed (Ex. xvi., etc.); and to many minds this conveys the idea of Israel living perpetually in camp around the tabernacle, fed only by miracle. But nothing like this is affirmed in the Pentateuch. The flocks of the people are mentioned when they left Egypt (Ex. xvii. 3, etc.), and at various periods of their stay in the wilderness (Num. vii., xx. 4, etc.), and at the close of the forty years (Num. xx. 19, xxxii. 1, etc.); agricultural occupations are implied in some things that are said of them; game and fish are mentioned as resources (Lev. xvii. 13; Deut. xiv. 5, 9, 10, 11, etc.); when they left Egypt and when they reached the borders of Edom, they had ready money to buy what they needed (Ex. xxv. 2, 3; Deut. ii. 6, 28, etc.); and, finally, they came out of Egypt a circumcised and unwarlike body, but had become an uncircumcised and a warlike people (Josh. v. 4–7) thirty-nine years later, when they departed from Kadesh. Here again, if we supply by imagination the omitted details, we must supply them according to the probabilities of the case. Instead of picturing Israel as most of this time in camp around the pillar of cloud or fire, feeding on miraculous manna, we must picture most of them as scattered through the deserts, living lives of hardship, losing much of the civilization with which they left Egypt, growing neglectful of religious rites, but yet becoming disciplined in the qualities which would fit them for accomplishing Jehovah's purposes.

Hittites.—According to the Biblical narratives the land promised to Israel was not merely the narrow tract of Palestine, but all the land of the Hittites (Josh. i. 4), from the Mediterranean to the Euphrates (Gen. xv. 18; Ex. xxiii. 31, etc.)—substantially the territory which later formed the kingdom of David and Solomon. In Abraham's time there was a settlement of Hittites near Hebron (Gen. xxiii.), but the Hittites lived mainly to the north of Palestine, as in later times. Both before and after the time of Moses the Hittites proved themselves formidable enemies even to so great powers as the empires of Assyria or of Egypt. But we should think of them as forming, not properly an empire, nor even a confederacy, but rather a hegemony. The region was occupied by a vast number of petty sovereignties, some of them Hittites by race and some belonging to other races, but with a traditional custom of uniting for war in time of peril under Hittite lead. According to Genesis the Hittites proper were one division of the Canaanite family of tribes, the term Canaanite being used sometimes for the whole family and sometimes for the branch of it which inhabited the lowlands of the Mediterranean coast. The whole family is affirmed to be of Hamitic descent (Gen. x. 6, 15–20), but as early as Abraham's time the southern Canaanites apparently spoke a Semitic language and followed Semitic customs. The northern Hittites, according to the article HITTITES in the ENCYCLOPÆDIA BRITANNICA, were not Semitic, which, in the circumstances, seems equivalent to saying that they had not become Semiticized.

In Abraham's time the region had other inhabitants besides the various Canaanite peoples. Whether the inhabitants of the five Cities of the Plain were Canaanite we are not informed, but there is a suggestion to the contrary in the fact that Abraham was then on intimate terms with his Amorite and other Canaanite neighbors (Gen. xxiii., xiv. 13, 24, etc.), and on very different terms with the men of Sodom and Gomorrah. At that time the Rephaim, the Zuzim (Gen. xiv. 5, 6), and other giant tribes were in their seats east of the Jordan and elsewhere, and the Philistines were in the Shephelah (Gen. xxi. 34, xxvi. 1). In these circumstances no one is qualified to say whether Melchizedek, king of Salem, the worshipper of God Most High, who came out to meet Abraham on his return from overthrowing the four kings (Gen. xiv. 17–20), was a Canaanite prince or a man of some other race. In addition to these more primitive peoples, and largely out of materials furnished by them, the Moabites, Ammonites, Edomites, Midianites, and other affiliated nations were formed during the interval between Abraham and Moses; at the time of the exodus they had been in existence for many generations.

Joshua.—The circumstances thus detailed account for the fact that, though the Israelites numbered 600,000 fighting men, the invasion of the Promised Land yet seemed to them a formidable undertaking. Whenever they made their attack they would provoke a collision, not merely with the Amorite and other Canaanite tribes east and west of the Jordan, but with the whole power of the Hittite hegemony, coming to the aid of these tribes. As a matter of fact the account is that they made the attack; that they fought two decisive great battles; the first with a local confederacy of kings in the south (Josh. ix. 1 and x), and the second at the Waters of Merom (Josh. xi.), apparently with the combined forces of the hegemony. In the Book of Joshua, and in the first chapter of Judges, we have some details of the local conquests made before and after these two great battles. Where the two books relate the same facts, the statements of one book are in the same phraseology with those of the other—a mere transcript of it; where the statements differ we must hold that they relate to different transactions, and not that they are distorted versions of the same transaction. In this history of details the name of Caleb is very prominent, and the Books of Joshua and Judges agree with the Book of Numbers in representing Caleb as an original member of the tribe of Judah, and not a late case of adoption into the tribe (Jud. i. 12–15; Josh. xiv. Num. xiii.; and xiv.)

Division of the Land.—But these details of fact are meagre. Not only do they leave our curiosity unsatisfied, but they leave the most important phenomena of the immediately subsequent history unaccounted for. How did it happen that Israel stopped short in his successful career of conquest, that he made no attempt, so far as we are informed, to seize the northern portions of the land which had been promised him (Josh. xiii. 1–6), and that he allowed himself to be contented with only half possessing (Josh. xxiii. Jud. i.) even the portions of it which he had conquered? No explanation is offered of this very strange fact, though our attention is called to the fact itself. That this course of conduct was adopted deliberately, in the life-time of Joshua, appears from the full accounts given of the division of the land, and of the sending back of the forces of the two and a half tribes. With the division of the land by Joshua the accounts of this period properly close, though they incidentally mention several events which occurred later (Josh. xxiv. 29–33, xvi. 10, xvii. 13, xix. 47; Deut. xxxiv. 1; Gen. xiv. 14, etc.).

Institutions.—To complete our treatment, we must inquire briefly concerning the institutions and the sacred literature which the Bible ascribes to this period. The records do not justify the assertion so often made, that the Israelites came out of Egypt an unorganized mob, and received their institutions as something entirely new, through Moses in the wilderness. On the contrary, they tell us that the people had their own officers in Egypt and in the wilderness, that they were under the lead of their hereditary princes (Ex. v. 14, iii. 16, 18; Num. vii.; Ex. xxiv. 1, 9, etc.); while the whole account of the departure from Egypt presupposes that they were splendidly organized for prompt movement. The work done by Moses in appointing the captains of thousands and of lesser divisions (Ex. xviii. 21, 25) must therefore be understood as supplementary to forms of organization already in existence. The records further say that Israel had a priesthood (Ex. xix. 22, 24, xxiv. 5; Num. viii. 18, etc.), had sacrifices (Ex. xxiv. 4–8, etc.), had a sanctuary tent (Ex. xxxiii. 7–10), previous to those appointed at Sinai. The author of the Epistle to the Hebrews, referring to the solemnities of the reading of the Book of the Covenant—solemnities which took place before the giving of the Levitical ritual from Sinai—says that Moses took the blood, with water and scarlet wool and hyssop, and sprinkled the book and the people (Heb. ix. 19–21). If this be correct interpretation, then the Mosaic records declare that much, even of the ceremonial law enacted at Sinai, was then not new, but re-enacted from usages previously existing; and if this is true of the ritual laws, much more is it likely to be true that, in other departments, the Pentateuchal legislation incorporated whatever was worth preserving of the previous institutions of Israel. The civil legislation of the Pentateuch certainly reads like a digest of decisions in adjudicated cases (*e. g.* Ex. xxi., xxii.). In fine, the account given in the Bible is that the institutions of Israel were largely the product of a gradual growth, like those of other peoples; that the divine work at Sinai was largely a work of digesting, and not exclusively of originating; that these institutions had previously had more than four centuries in which to develop themselves,

All the same, the records represent that the institutions were throughout divinely given, and that they were, to a large extent, miraculously given; given by Jehovah, who appeared to Abraham, to Jacob, to Joseph, and to Moses. To Moses at Sinai they attribute the judges' code, most of the parts of the priest code, the tabernacle and its worship, the instituting of the Levitical priesthood, in its two orders; to Moses, after leaving Sinai, they attribute most of the remaining parts of the priest code; to Moses, in the last year of his life, they ascribe the publishing of such of the civil and ceremonial laws as were needed for public information, in the proclamations recorded in Deuteronomy (Deut. i. 3, iv. 46, etc.). But they do not represent that these institutions were generally enforced throughout Israel in the days of Moses; indeed, they affirm the contrary. At the expiration of the forty years the Israelites had very generally discontinued circumcision (Josh. v. 5), and were doing every man what seemed right in his own eyes, in distinction from sacrificing at a common sanctuary (Deut. xii. 8). Indeed, many of the Pentateuchal laws are limited in their very terms, either to Israel in camp around the tabernacle (*e. g.* Lev. xvii. 3), or else to Israel in the future (*e.g.* Deut. xii. 10) settled in the promised land. That the different parts of the Torah were given at Sinai (Lev. vii. 37, 38, etc.), and that certain specified parts of it were at once put into operation (Ex. xxxv–xl.; Lev. viii., etc.), the writings tell us; but they also give us information which justifies the inference that many of its most important provisions were left generally unexecuted.

Sacred Writings.—In the passages which speak of the high-priest's diadem and breastplate, in the prescription for divorce by writing in the book connected with the proceedings in cases of jealousy, in the directions to write down the division of the land among the tribes, and in several other passages, these records give us to understand that Israel, in the days of Moses and Joshua, was a people among whom the art of writing was well known and the doing of business by written instruments was customary. In the closing chapters of Deuteronomy it is said that Moses wrote the Book of the Law, that he committed it to the charge of the priests (Deut. xxxi. 9–13, 24–27), to be kept beside the ark; the two tables of the covenant, written thirty-nine years previously, being within the ark (Deut. x. 5, etc.). This Book of the Law is mentioned many times in Deuteronomy, in various connec tions. In the following book we are told that it wa handed over to Joshua, with a solemn charge concern ing it (Josh. i. 7, 8). We have various details as t what Joshua did with it, including the writing of complete section of it on the altar at Mount Ebal (Josh viii. 30–33), and the reading of the whole law after ward in the public assembly (Josh. viii. 34, 35). W are further told that Joshua, among his latest acts wrote additional matters in the Book of the La (Josh. xxiv. 26). We are further told that befor Moses received the two tables of stone he wrote th Book of the Covenant at the command of Go (Ex. xxiv. 4); that when he received the tables he re ceived other matters, and apparently put them i writing (Ex. xxiv. 12, xxv.; Deut. iv. 14, etc.); that h was commanded to write concerning Amalek in "Th Book" (Ex. xvii. 14). We are further informed tha he wrote a work on the exodus of the Children o Israel, this information being made to introduce a lis of the stations where they encamped in the wildernes (Num. xxxiii. 2). Whether the other writings there mentioned were or were not a part of the written law mentioned in Deuteronomy and Joshua we need not now ask. The Books of the Hexateuch do not say that they are themselves throughout identical with the books that Moses and Joshua wrote, and they do not say the contrary; but they do affirm that Moses and Joshua wrote sacred books, and that the contents of those books were largely the same with their own. (See BIBLE and PENTATEUCH.)

The central thought which dominates the history of this period, as related in these books, is Jehovah's having chosen Abraham and Israel as his peculiar people, the channel of his blessing to the nations; and, as subordinate to this, the preparation for establishing his sanctuary on earth, the building of the sanctuary tent, and the setting it up, according to promise, in the land given to Abraham. Jehovah is presented throughout, not as a local deity, but as the God of the universe, who has chosen Israel for especial purposes.

Chronology.—The chronological outline of this first period is very simple. Isaac was born (Gen. xii. 4, xvii. 1, 17, etc.) 25 years after Abraham first came to Palestine, and Jacob 60 years later (Gen. xxv. 26); Jacob was 130 years old when he went into Egypt (Gen. xlvii. 9), so that this was 215 years after Abraham came to Canaan. The exodus was at the end of 430 years (Ex. xii. 41, etc.), including the 215 (many hold that the 430 is exclusive of the 215); the wandering in the wilderness covered 40 years (Deut. i. 3, etc.), and Joshua's conquest of Canaan not less than 7 years (Josh. xiv. 10, etc.), and probably not much more.

II. *Second Period. From the Death of Joshua to the Death of David. The Wandering Sanctuary.*

In treating of the second period, we must begin with the chronology, because that is a matter of dispute, not only between different schools of critics, but among those of the same school. We cannot, of course, enter upon disputed questions, but must explain the chronology used in the present treatment. In 1 Kings vi. 1 it is said that the founding of Solomon's Temple was 480 years after the exodus. This might date from either the beginning or the end of the 40 years of the wandering in the wilderness, the latter being the more common usage. This number is rejected by many scholars for various reasons, the strongest being its alleged misfit with the numerals given in Judges. If it can be shown that it fits those numerals, instead of misfitting them, the other reasons for rejecting it have not much weight.

Two principles which we need to keep distinctly in mind in studying this matter may be illustrated by two familiar instances. When it is said that Jesus lay in the grave three days, it is not meant that the duration of his stay there was three times twenty-four hours, but that his stay there included either part or the whole of three successive periods of a day and night each. This represents the ordinary use of such terms as "day" or "year" in the time-statements in Hebrew literature. Again, when it is said that Samson's wife wept "the seven days, while their feast lasted" (Judges xiv. 17), the meaning is not that she began weeping the first day of the feast, and wept all through the seven days, but only that the days of her weeping closed with the seven days of the feast; she began to weep the fourth day, according to the versions, and the seventh day, according to the Hebrew text (Judges xiv. 15). By a precisely similar use of terms the statement "the land had rest forty years" means up to the close of the period of forty years then current, and affirms nothing as to the previous parts of the forty years.

The judges, up to the time of Gideon, were heroes, raised up on special occasions; we have no information as to how long any one of them judged Israel. In Gideon's time the attempt was made to establish a monarchy; it was unsuccessful, but from the death of Gideon the chief magistrates of Israel formed a succession, and the years of the administration of each are given. When we notice the fact of this change of constitution we also notice another very simple fact, which is the key to the chronology of the Book of Judges; up to the death of Gideon the time is counted in periods of forty years each, but after his death it is counted by the years of the successive chief magistrates. The count of years is as follows:

Period.	Text.	Years.
From Joshua to death of Gideon	Jud. iii. 11, 30; v. 31; viii. 28.	200
Abimelech	Jud. ix. 22	3
Tola	Jud. x. 2	23
Jair	Jud. x. 3	22
Samson	Jud. xv. 20	20
Ammonite rule	Jud. x. 8	18
Jephthah	Jud. xii. 7	6
Ibzan	Jud. xii. 9	7
Elon	Jud. xii. 11	10
Abdon	Jud. xii. 14	8
Eli	1 Sam. iv. 18 and Jud. xiii. 1	40
Ark in Kirjath-Jearim	1 Sam. vii. 2	20
Samuel (obtained by subtraction)		20
Saul	Acts xiii. 21	40
David	2 Sam. v. 4	40
Solomon, up to beginning of the 4th year		3
Total	1 Kings vi. 1	480

According to this table the interval from the conquest of Sihon to the accession of Jephthah was, counted inclusively, 288 years, which is near enough to Jephthah's 300 years (Judges xi. 26) for the purposes of a round number. It was 438 years from the crossing of the Red Sea to the accession of Saul, the close of the period of the judges, in "the days of Samuel the prophet," which is sufficiently near to the 450 of Acts xiii. 20, if the most common understanding of that passage is to be accepted. There is, therefore, on the face of it no reason for rejecting any numeral concerning this period, given in any part of the Old or the New Testament. As we proceed to look at the history on this cast of the dates we ought to find reasons either for rejecting the cast or for accepting it as confirmed.

The First Forty Years.—According to this view of the matter, the forty years after the death of Moses included two great events, the conquests by Joshua and Caleb and the oppression by Cushan-rishathaim with the rescue under Othniel. As we have seen, the conquests lasted for more than seven years; no one knows for how much more. Their abrupt termination was due to Israel's lack of faith for pursuing them, but this may in turn have been connected with the approach of Cushan-rishathaim. Concerning this Mesopotamian conqueror we have little information. Evidently, he was a monarch of great power. We naturally think of the deliverance by Othniel as wrought out in hard-fought battle. Whether the Canaanites aided the oppressor, or made common cause with Israel against him, we are not told; but at all events, the policy of exterminating the Canaanites seems to have been abandoned (Jud. ii. 3) at this early date. The oppression lasted eight years (Jud. iii. 8); further dates are not given.

The Second and Third Forties.—Three prominent events are spoken of as occurring within the next eighty years: the oppression by Eglon, lasting eighteen years (Jud. iii. 14), the conquest of Leshem by the tribe of Dan, and the civil war with Benjamin. Eglon was at the head of a petty confederacy of Moabites, Ammonites, and others, and the deliverance was effected by assassination. There is a great falling off in historic dignity, as compared with the events of the earlier generations. Doubtless the struggle against Cushan-rishathaim had been desperate, and had left Israel in an exhausted state. The Danite conquest and the Benjamite war are not even mentioned in the narrative part of the Book of Judges, but only in the two historical stories (Jud. xvii.–xviii., and xix.–xxi.) with which the book closes, but there is no difficulty in determining their date as within the period now under consideration.

Fourth Forty Years.—For the first half of the fourth forty years, Israel was in subjection to Jabin and Sisera (Jud. iv. 3). At the same time, the Philistines were ravaging the southern part of the country, which seems to have been helpless before them (Jud. iii. 31, v. 6, 8, x. 11). Apparently the Israelites had become demoralized by the civil war, and their enemies took advantage of the situation. At length, the northern invaders were defeated by Deborah and Barak, and the Philistines by Shamgar, and peace was restored.

Fifth Forty Years.—During the early part of the fifth forty years came the Midianite oppression, lasting for seven years (Jud. vi. 1). It was different from all that had preceded it—a series of summer raids from the tribes of the desert, devouring impartially both Israelite and Philistine (Jud. vi. 4). The rescue from this came through Gideon, and was followed by civil dissensions (Jud. viii. 1, 13–17).

Sketch of the Successive Judges. Gideon.—Gideon died just at the close of the forty years. He had refused to become king, but the feeling in favor of monarchy was so strong that his son Abimelech was able at once to set up a kingdom at Shechem (Jud. viii. 23, ix.); had he been less worthless, he might have been the founder of a dynasty. As it was, his insignificant reign of three years is counted as one of the administrations of Israel, and the constitution was so far changed that the judges thenceforth ruled successively, instead of being heroes, called to the office by some emergency. The very brief accounts given of most of them indicate that they were more distinguished for their wealth and their families than for their great deeds. The administrations of Abimelech, Tola, and Jair lasted forty-five years. During that time, Israel became idolatrous, and was oppressed by the Philistines from the west and threatened by the Ammonites from the east. This particular Philistine oppression is but barely mentioned in the main narrative in the Book of Judges (Jud. x. 7), but is probably the one connected with the story of the exploits of Samson (Jud. xiii. 2–xvi.). Samson's birth and the escapades of his earlier life occurred while Tola and Jair judged Israel; then followed his delivering of Israel, his service for twenty years as judge, his relapse into folly, and his death. Upon his death, the Ammonites crossed the Jordan (Jud. x. 9), established their supremacy for eighteen years, and were then defeated by Jephthah. Jephthah was succeeded by Ibzan, Elon, and Abdon, of whose reigns we have no details.

Eli.—Then the high priest Eli became judge. Our knowledge of him is mostly derived from the story of the childhood of Samuel, in 1 Samuel, the first three chapters, and the first sentence of the fourth chapter. The narrative part of Judges probably mentions the times of Eli in a single sentence (Jud. xiii. 1), and when the narrative is resumed, in 1 Samuel, at the second sentence of chapter iv., after the intervening historical stories, it starts with the closing events of the last year of Eli, the great defeat by the Philistines, and the capture of the ark. We have no explanation of the fact that Eli was judge, as well as high priest, and none of the change of the high priesthood to the family of Ithamar, to which he belonged, from the family of Eleazar.

Samuel.—The death of Eli left Israel without a chief magistrate, and with no ark in the sanctuary, but with a master mind among them, a man sent from God, the young prophet Samuel. The ark was soon returned from the country of the Philistines (1 Sam. vi.), but it does not seem to have been Samuel's policy at once to restore the glories of the sanctuary. The ark was allowed to remain in seclusion. Samuel seems rather to have been occupied with plans for instructing the people, and reviving among them the influence of the spirit of prophecy. After twenty years thus passed (1 Sam. vii. 2), he gathered Israel to Mizpeh, accepted the office of judge (1 Sam. vii. 6), defeated the Philistines decisively, and organized the most successful administration which had blessed Israel since the days of Joshua (1 Sam. vii. 9–17).

The duration of the separate administration of Samuel is not mentioned in the records, but the impression is made that he was a young man at the death of Eli, and he is certainly represented as an old man, whose sons are filling important public offices (1 Sam. viii.), a good while before the accession of Saul. According to the cast of the chronology which we are now following, twenty years are to be accounted for by assigning them to Samuel, besides the twenty years between the death of Eli and the assembly at Mizpeh; and this accords well with the time required for the events.

Saul the First King.—At the conclusion of this time Saul became king, it being stipulated that Samuel was to remain judge for life (1 Sam. vii. 15). Saul was then apparently a young man. After his defeating Nahash and organizing his camp-capital at Gibeah and Michmash (1 Sam. xiii. 2), many years seem to have passed uneventfully, for when we catch the next glimpse of him, his son Jonathan is a warrior grown (1 Sam. xiii. 3). In view of this fact, it is evident that the reign of Saul needs the full term of forty years assigned to it by the apostle Paul (Acts xiii. 21), without overlapping the reigns of either David or Samuel. The last years of Saul were full of vicissitude, and close with the defeat at Gilboa and the most utter subjugation to the Philistines which Israel had ever suffered (1 Sam. xxxi., especially v. 7).

After the death of Saul, perhaps five years after, his son Ishbosheth became king, Judah being a separate kingdom under David. A civil war followed, lasting to the end of seven and a half years (2 Sam. ii. 10, 11). Then David became king over all Israel, reigning in that capacity for 33 years (2 Sam. v. 4, 5). This reign divides itself into three periods—a period of wars, a period of rest, and a period of domestic discords.

Wars of David.—The period of wars began with two or more desperate defensive campaigns against the Philistines (2 Sam. v. 17–21 and 22–25). As long as the war between David and Ishbosheth had lasted, the Philistines had apparently been satisfied with a condition of things which left neither party in condition to threaten their supremacy; but as soon as David's acceptance by the ten tribes gave prospect of a united Israel the Philistines at once interfered. David's accession had been signalized by the capture of Jerusalem, where he proceeded to establish his capital, and there he was attacked by these warlike enemies. From 2 Sam. xxiii. 13–17 it appears that the situation was sometimes desperate. Later, David assumed the offensive and entirely subdued the Philistines (2 Sam. viii. 1 and xxi. 15–22). Then followed in rapid succession the conquests of Ammon, Moab, the Syrian nations to the north and north-east (2 Sam. viii., x.–xii., etc.), and Edom. The records do not inform us as to the duration of these wars, but there are reasons for holding that they lasted some 13 or 14 years, to about the middle of the 40 years of David's reign. Early in the course of them David adopted the custom of remaining at his capital, taking the field with his armies only on extraordinary occasions (2 Sam. xxi. 17; xii. 28, etc.). He occupied himself much with building and adorning Jerusalem. It was while he was thus at home, during a war conducted by his generals, that the affair of Uriah's wife occurred (2 Sam. xi.). That sin was the culmination of a dangerous period in David's moral history. To the period between the commission of the sin and the repentance for it belong the most odious, at least, of David's cruelties to his prisoners of war. From the time of the repentance there is a marked and favorable change in his character.

David's Period of Rest.—The series of wars at length came to a close, the kingdom being greatly enlarged. In 2 Sam. viii. 15–18 we have a statement of David's administration as then organized. David at that time had a group of grown sons around him. The closing sentence of the statement tells us that David's sons were priests. If this is to be strictly understood, it is not so incredible as it seems to many. The assertion would, indeed, be very strange if the commonly received opinion were true, that David brought up the ark to Jerusalem immediately after his accession, and established before it an elaborately ritualized Levitical worship. But this opinion, universally accepted as it is, is untrue, if the account in Chronicles is historical, for that account says that, when David brought up the ark, Israel extended from Hamath to the River of Egypt (1 Chron. xiii. 5), hence it follows that he brought up the ark, not at the beginning of his reign but after the completion of his conquests. In short, the account in the Bible is that David, in his earlier years, had been a model of religious manliness; he had deteriorated when he consented to become the vassal of King Achish (1 Sam. xxvii. and xxviii. 2); he did not entirely recover from the deterioration until he was brought to himself by the consciousness of the enormity of his sin in the affair of Uriah. If he had been at his accession the pious king he is often represented to have been, eager, as the first act of his reign, to re-establish the worship and the spiritual power of the religion of Jehovah, he might perhaps have escaped his great downfall as well as many of the calamities which made his later years painful. It was not till after his fall and repentance that he seriously set about re-establishing the national worship of Jehovah. Even then he was uninstructed and incorrect in the steps he first took. His sons were priests; the ark was carried on a new cart (2 Sam. vi.) instead of on the shoulders of the Levites; it required the severe lesson given in the death of Uzzah to teach the king to pay proper regard to the precepts of the law. His heart was in it, however, and once started in the right path he made rapid progress. He formed the ambition for building the temple (2 Sam. vii.), and when forbidden to build directed his energies to preparing for the work of his son, both in the gathering of materials and skilled workmen, and in the arranging for the service which was to be used in the future edifice (1 Chron. xxii.–xxix.). In all this he became what he had not always been, the man after God's own heart.

David's Period of Domestic Discord.—David's zeal for the service of God and the building of the temple did not prevent his reaping bitter harvests from the seed he had previously sown. After a short time of rest and prosperity his troubles began over his children, Tamar, Amnon, Absalom, and Adonijah (2

Sam. xiii., etc.), and continued to the end of his life. Throughout all these afflictions he kept steadily to his preparations for the Temple and its service, and, in connection with these, for the succession to the throne of Solomon, the promised Temple-builder (1 Chron. xxiii. 1). There came a time, at length, when the national assembly of Israel was convened for public action on these matters. The gathering is described in 1 Chron. xxii.–xxix., closing with the first sentence of xxix. 22, where the section properly ends. The date of this gathering is, perhaps, incidentally given in 1 Chron. xxvi. 31, as the fortieth year of David, though this is not certain. Meanwhile Absalom had been busy. There had been a pestilence connected with the numbering of the people (2 Sam. xxiv.); there had been other calamities and occasions of discontent (2 Sam. xxi. 1–11); for some years Absalom was taking advantage of these to secure followers and prepare for the rebellion. He rose in arms at the end of the fortieth year of David's reign (2 Sam. xv. 7). As David reigned forty years and six months this was the beginning of the last year of David. It may probably be that Absalom's rising in Hebron occurred at the very date of the assembly in Jerusalem when action was taken regarding the temple, and Solomon was proclaimed king the first time; but we need not insist upon this. The story of the revolt is familiar. David was heart-broken at the death of Absalom, but he held himself to his duties until the subsequent rebellion of Sheba was put down (2 Sam. xx.), and at this point the account as given in 2 Samuel abruptly ends. From the Books of Kings and Chronicles we learn that David became a helpless, listless invalid (1 Kings i.); that Adonijah, his eldest son then living, attempted to seize the throne and prevent the succession of Solomon; that the attempt was defeated and Solomon made king a second time (1 Chron. xxix. 22), largely through the adroitness of the prophet Nathan; and that David soon after died.

Judah and Israel.—Throughout the period which closes with the death of David the Biblical narratives represent that Israel was a unit made up of the twelve tribes (Jud. i. 1, xx. 1, 2, etc.); that the judges were all chief magistrates of Israel, and none of them mere local dignitaries, however the actual jurisdiction of some of them may have been narrowed by circumstances; that the sovereignty rested with the nation and not with any one tribe; that Judah, however, though relatively insignificant during the time between Othniel and David, yet had a certain recognized primacy among the tribes (Jud. i. 2, xx. 18, etc.). In the Books of Judges, Ruth, and Samuel, when Judah is mentioned as distinct from Israel, it is always with reference either to this primacy or to the double kingdom in the days of Ishbosheth, or to purely tribal interests, and never with reference to such a state of things as existed after the death of Solomon.

During this period it is probable that the population was fluctuating; at times greatly diminished as the result of foreign or domestic wars, and replenished in the times of comparative prosperity. It is said to have numbered some 600,000 fighting men at the beginning of the conquest under Joshua (Num. xxvi. 51); about 427,000 are mentioned in the account of the civil war with Benjamin (Jud. xx. 2, 15); for his first campaign Saul raised 300,000, including (or possibly exclusive of) 30,000 men of Judah (1 Sam. xi. 8); the incomplete census made in the later years of David enumerated several times this number of warriors (2 Sam. xxiv. 9). However we may account for the numbers that seem at first thought to be surprisingly large, it is evident that the region is represented as quite densely peopled throughout these times.

Prophecy.—The Biblical narratives represent that the gift of prophecy, which had been very abundant in the times of Moses and Joshua, continued in a slender line of succession through the times of the earlier judges (Jud. iv. 4, xiii. 6, etc.). It had become almost extinct when Samuel was a child, but not quite so (1 Sam. iii. 1, ii. 27). With the scarcity of the gift itself, the name of prophet had gone into disuse, being temporarily superseded by the name seer (1 Sam. ix. 9). With the early manhood of Samuel came a glorious revival of the revealing of the word of the Lord in prophecy (1 Sam. iii. 19–21). Among the manifestations of this were the companies of prophets which appear in Samuel's time (1 Sam. x. 5, 10, xix. 20, etc.), and the group of distinguished men of God to which belonged Samuel, Gad, David, Nathan, Asaph, Heman, Jeduthun, Ahijah, Shemaiah, and others. There is no reason for picturing the companies of prophets as bands of wild Dervishes engaging in crazy religious dances; it is more consistent with what we know of the prophets to picture them as sober citizens, holding out-door and in-door meetings for purposes of religious and patriotic instruction and persuasion. In Saul we have the case of a man who prophesied insanely (1 Sam. xviii. 10, xix. 24); we are not therefore to conclude that insane conduct was the regular accompaniment of prophecy, but rather that religious utterance was in Saul's case, as in some more modern instances, one of the symptoms of insanity. The revival of prophetism under Samuel was not the introducing of religious wildness, but a fresh effusion of genuine spiritual earnestness.

The alleged conflict between the prophets and the priests, in the times of David and Saul, the alleged clinging of the prophets to Saul and of the priests to David, and several other like matters are purely the product of the imagination of the nineteenth century. The Biblical account of the matter is that the priests, the prophets, and David himself were alike faithful to Saul to the last, so far as possible, and that the priests and the prophets were alike friendly to David from the beginning.

Civilization.—The standard of civilization in Israel does not appear to have been high during the period of the judges. In the circumstances it hardly could be; too much of the time was occupied either with civil wars or with servitude to foreign oppressors. The times of Gideon, Samson, and Jephthah verge toward barbarism, as compared with the times of Moses and Joshua. There is improvement, however, from the time when Samuel becomes influential. Along with the revival of prophetism comes a revival of the art of reading and writing (1 Sam. xxi. 13; 2 Sam. xi. 14); music, poetry, and historical studies are cultivated (1 Sam. xvi. 16; 2 Sam. i. 17, xxiii. 1, xi. 21, etc.); the ancient laws of the nation come to be in men's mouths (1 Sam. viii. 5, xii. 1-8, etc.); in the earlier years of David, with the building of Jerusalem as the capital, architecture becomes a prominent art in Israel (2 Sam. vii. 2, etc.). History has seldom witnessed so sudden a blossoming out of a nation as that which occurred in David's kingdom during the first half of his reign. A group of tribes which had maintained a precarious existence for some hundreds of years, confined to a narrow territory, and insecure even in that, half the time without independence, often on the verge of dissolution through internal discords, without power, without prestige, had suddenly started upon a career of conquest, had annexed and organized into a compact monarchy peoples far more numerous and more civilized than itself, and had taken a stand among the great nations then existing; and this startling expansion of political power had been accompanied by an equally marked apparent advance in culture, civilization, and religious enlightenment and earnestness.

Davidic Psalms.—The titles of the Psalms, as naturally understood, ascribe a large number of them to David and his younger contemporaries, Asaph, Heman, and Jeduthun. The Books of the New Testament and the Books of Chronicles attribute a dozen or more additional psalms to David. With this agrees the fact that the earlier books of Amos and Samuel attribute lyric skill and lyrical composition to David

(Amos vi. 5; 1 Sam. xvi. 16; 2 Sam. iii. 33, xxiii. 1, etc.). Most of the critical arguments commonly set up against this testimony are utterly indecisive. The fact that a Psalm has no title inscribing it to David has only negative force, as opposed to the positive testimony of the Chronicles or of Paul; if a Psalm contains Aramaisms, that does not prove its late origin, for it would be a miracle if the Hebrew of the times of David had not been affected by his Aramæan conquests; a Psalm is not proved to be post-Davidic by its naming the Temple, for there was a temple in Shiloh in Eli's time, and the Temple was always in David's mind in his later years; if a Psalm prays for the restoration of Israel, scattered among the nations, it may refer to the state of things existing when David came to the throne, and not to that at some later date; and so with other like reasons. On the whole, we are justified in holding that a large proportion of the Psalms were written in the times of David. If this be accepted as true, it must also be held, even by a scholar who regards the Books of Judges and Samuel as edited at the same time with the Books of Kings, that the sources of these Books are largely to be dated as early as the times of David. But it can also be proved that these Books, as a whole, are distinct from the Books of Kings, and date back to a time not much later than David. See No. 3, and Kings and Samuel. That these Books and Psalms of the time of David presuppose the existence of sacred writings, containing much, if not all of the contents of the first six Books of our present Bibles, in the very phraseology in which these now stand, is a proposition which is strenuously denied, and which has sometimes been affirmed on insufficient grounds, but which is capable of being abundantly proved. (See Pentateuch.)

Pentateuchal Institutions.—That some of the institutions described in the Pentateuch were in existence in the times of the judges is held, even by the critics who date the Pentateuchal writings after the exile; that the full Pentateuchal system was in complete operation throughout these times would hardly be claimed by any one who has thoroughly studied the matter. The historian describes the perversion of justice by Samuel's sons, in the language of the code now found in Deuteronomy; when the elders come to Samuel to ask a king they cite the same code, and demand their rights under it (1 Sam. viii. 3, 5, 19, 20); the account of the conference between David and Nathan respecting the Temple is all based on citations from the Pentateuch, and on the idea that the period of rest had now come, when the sanctuary was to be permanently established (2 Sam. vii.); Elkanah and his family attended yearly festivals of Jehovah at Shiloh (1 Sam. i.); the law that the fat should be first burned before the priest's portion was taken away was operative in his time (1 Sam. ii.); a hundred other like instances are mentioned. The records say that Mosaic legislation was then in existence, in the same words as now; they are silent as to whether this is true of the entire Mosaic legislation which we now have; they do not inform us how far or how continuously this legislation was enforced. They recognize it fully enough, however, so that no argument for the non-existence of any part of it can fairly be drawn from the negligence of the times in enforcing it.

Central Sanctuary.—The case of the law for the central sanctuary is the one most strongly urged in opposition to these views. The case is a pretty strong one, if we are compelled to follow the overstrained interpretation given in many quarters to this law. But if we may interpret it as other beneficent laws are interpreted, especially if we may regard it as held in abeyance whenever circumstances rendered obedience to it impossible, the strength of the case vanishes. The allegation is that the law required that Israel, in Canaan, should offer sacrifices only at one central sanctuary; that, throughout the period before Solomon, this law was not only neglected, but was constantly violated, even by the men who are spoken of as the divinely appointed leaders of the people; and that this proves that these leaders knew nothing of such a law, and that, therefore, neither the law nor the book containing it were then in existence.

But the accounts that are given in the Bible certainly represent that Jehovah had one central sanctuary in Israel, and no more, throughout this period. At Joshua's death this was at Shiloh, where were the ark and the tent of meeting (Josh. xxii. 12, 19, 29, etc.). Occasionally afterward the ark and perhaps the tabernacle were removed temporarily, but we are left to infer that they were always returned to Shiloh (Jud. xx. 1, 26; xxi. 12, etc.). In Eli's time the tent of meeting seems to have been included in a permanent temple at Shiloh (1 Sam. i. 9, iii. 15, ii. 22). Annual feasts were there kept to Jehovah (1 Sam. i. 3, etc.). After the capture of the ark by the Philistines, it was not at once returned to the sanctuary, but both ark and sanctuary were yet in existence. There is no ground for the often repeated statement that Shiloh was at that time burned by the Philistines; and, whatever became of Shiloh, the sanctuary continued to be an existing fact. At some unknown time it was removed to Nob (1 Sam. xxi.), but it did not meanwhile cease to be. It was "before the Lord" that Samuel laid up the book, when he wrote in it the manner of the kingdom (1 Sam. x. 25); it was in "the house of God" that David received the shewbread and the sword of Goliath, which had been deposited there (Matt. xii. 4, etc.). But the ark was not in its place in the sanctuary to serve as the unifying principle of the national worship. It was in the custody of the men of Kirjath-Jearim, in a house on a hill near that town, or, possibly, in the city of Gibeah (1 Sam. vii. 1; comp. xiv. 18, etc.). Both ark and sanctuary were near Saul's head-quarters. The account is that, in David's time, they were moved, respectively, to Gibeon and to Jerusalem (1 Kings iii. 4; 2 Chron. v. 5; 1 Chron. xvi. 39; 2 Sam. vi., etc.). But from the time when the ark was captured until David brought it to Jerusalem, there is no trace that it was ever restored to its place in the Holy of Holies, or that the great national solemnities of the religion of Jehovah were celebrated.

Sacrifice at Many Places.—These facts show that the law for a central sanctuary was neither unknown nor wholly neglected; but, in showing this, they render more conspicuous the fact that Gideon, Samuel, and others sacrificed in many different places instead of at the one sanctuary alone. At first thought, this looks as if that part of the law which restricted the offering of sacrifices to one place was to them unknown. But some of these instances of sacrifice were illegal (Jud. viii. 27, etc.); others were mere sacrificial feasts, expressly exempted by the law from its operations (Deut. xii. 15); of the rest, it may fairly be said that the conditions contemplated by the law did not exist, and therefore the law itself was fairly to be regarded as in abeyance. The law was to be operative when Jehovah had given Israel rest from all his enemies (Deut. xii. 10), and had chosen a place to put His name there (Deut. xii. 5). The rest under Joshua proved to be brief and incomplete; it was not till the completion of the conquest by David that Jehovah chose the place for His name (2 Chron. vi. 5, 6, etc.), and thus completed the conditions in which the law was binding. For most of the time before David, the law forbidding sacrifice except at the central sanctuary could have been obeyed only by abstaining entirely from worshipping Jehovah by sacrifices. This was not the intent of the law. In these circumstances the law necessarily waited for the arrival of the conditions in which it would be binding, and meanwhile, Israel sacrificed, subject to the older law now recorded in Exodus (Ex. xx. 24–26).

That this is the account of the matter given in the Bible appears from 2 Samuel vii., and from the various places in Chronicles and elsewhere in which that chapter is quoted. The Bible not merely gives this account of the matter, but it mentions this as the fact that characterized the whole period of the judges, up to the later years of king David. It was the period when Jehovah had not yet commanded a house to be built for him, but when he went hither and thither in tent and in tabernacle—in short, the period of the wandering sanctuary (2 Sam. vii. 6; 1 Chron. xvii. 5).

III. *Third Period. From Solomon to Zedekiah's Captivity. The Sanctuary of the First Temple.*

Reaching the Third Period of Israelitish history, we need to pay attention to another principle of chronological statement in addition to the two mentioned in beginning with the Second Period. Counting by the years of the American Presidents, we have our choice between calling the calendar year 1885 the first year of Cleveland, or the fourth year of Arthur, or the fifth year of Arthur, or the fourth or the fifth year of Garfield. Each of these five statements might be a mere variant expression for the same fact. Again, Arthur was President five years, if we count to him both the year 1881 and the year 1885; he was President four years, if we count to him only one of these two years; and three years, if we count to him neither 1881 nor 1885. If we were accustomed to count time, not by its actual duration, but by the number of calendar years through which an event extended, we ought not to be surprised if we found all three of these statements made concerning the administration of President Arthur; the differences of statement would represent, not discrepancies of fact, but merely varieties of expression. Precisely this variety of form of statement is common in the chronological data found in the Bible. The Biblical numbers need no other harmonizing than that which is effected by simply ascertaining the sense in which a numerical statement is used. But evidently this cannot be ascertained by any process of adding and subtracting, or averaging and distributing errors; but only by comparing parallel numbers, where such exist, and making them check and interpret one another. The comparison is a mere matter of practical arithmetic. One who accurately works out this problem finds not only that the Biblical chronology needs no correcting, but that, when the facts are examined in the light of the dates given, the difficulties which previously beset some of them vanish.

Solomon.—The accounts say that Solomon reigned 40 years (1 Kings xi. 42). He builded the Temple, and established its worship magnificently. His reign was enterprising, and marked by great increase of wealth and of means of culture. For many things he was eminently worthy of admiration. But he allowed himself to be misled by his love for magnificence and luxury and breadth of culture. With all his greatness, the records condemn him for having misused the most important of his opportunities. The kingdom came to him in good shape; but it was made up of a great variety of peoples; unless they should become homogeneous, it could not be expected that they would long hold together, either by bonds of force or of common interest. Solomon should have taken advantage of the circumstances to seek to unify his subjects, to bring them under the power of a common faith and a common patriotism. To this end, he should have maintained the simplicity of Israelite institutions, and should have been an earnest, though a kind, propagandist of the religion of Jehovah. He had time enough, and had large resources. Had he been content to be less splendid, he might have been far more successful. As it was, he alienated even his Israelitish subjects by laying heavy burdens upon them (1 Kings xii. 4, etc.), instead of having a sufficient regard for their interests, and meanwhile strove to attach the tributary rulers of the other tribes and nations to himself, not through their convictions, but by marrying their daughters and making concessions to their religious prejudices. Many contend that Solomon's building high places to various deities around Jerusalem was in consonance with the doctrines of the religion of Jehovah as then prevalent; but no one denies that the Books of Kings and of Nehemiah explicitly assert the contrary (1 Kings xi. 1–11; Neh. xiii. 26). By his course, Solomon perpetuated the distinctions of race and of religion in his empire, and thus kept the empire ready for disintegration.

A few incidents connected with the disintegration, before and after Solomon's death, are narrated in full, but beyond this no details are given. Hadad, of the royal family of Edom, and Rezon, one of the captains of Hadadezer of Damascus, had each escaped from David, and each, during the reign of Solomon, set up claims opposed to his (1 Kings xi. 14–25). The variations of the name Hadad or Hadar, and its compounds, cannot be satisfactorily explained by guessing that Hadar is a misreading for Hadad, any more than can the fact that the name is common to the kings of Edom and of Syria. The name appears spelled with *r* in the Assyrian inscriptions; it is spelled both ways in the lists of early Edomite kings, and in the royal names of Damascus.

More powerful and permanent than the opposition of Hadad and Rezon was that headed by Jeroboam, in northern Israel. Jeroboam became king of ten of the tribes. If Simeon and Reuben still retained their ancient seats, Rehoboam's kingdom was bounded on three sides by that of his rival, and on the fourth side by the Mediterranean. This was the more a possible condition of things, if the power of Hadad in Edom then favored the party in Israel opposed to the dynasty of David.

For this part of the history, that we may have a convenient measure of time, and at the same time avoid complications with disputed chronological theories, we will use the year of the division of the kingdom, that is, the year when Jeroboam and Rehoboam began to reign, as an era to date from, designating the dates as from the year A. Div. Of the course of the falling apart of Solomon's empire we only know, in addition to the facts already alluded to, that Moab had achieved independence early enough to be again subjugated by Omri, about A. Div. 50, and that the adverse government in Damascus had become powerful as early as the reigns of Asa and Baasha, say about 35 A. Div., or sooner.

House of Jeroboam.—During the first 17 years after the epoch of the division of the kingdom, Jeroboam reigned in Israel and Rehoboam in Judah. The latter was forbidden to attempt to reconquer the revolted tribes. He began his reign an exemplary worshipper of Jehovah, but failed to hold out. In his fifth year, he suffered invasion from Shishak of Egypt (1 Kings xiv.; 2 Chron. xii.). The years 18–20 A. Div. were the three years of Abijah, king of Judah. Jeroboam was still king of Israel, and was beaten by Abijah in a great battle (1 Kings xv.; 2 Chron. xiii.). We find that 21 A. Div. is a year that is counted as the first of Asa of Judah, whose accession is counted from the close of the twentieth of Jeroboam. The year 22 A. Div. is the last year of Jeroboam. The years 22 and 23 A. Div. are the two years of Nadab, who succeeded Jeroboam in the second year of Asa, and whose actual reign was for a fraction of each of these years.

House of Baasha.—The year 23 A. Div. was also the first of Nadab's successor, Baasha, whose first year was the third of Asa. The 24 years of his reign were A. Div. 23–46. The years 46 and 47 A. Div. were the two years of his successor Elah, who began to reign in the twenty-sixth year of Asa. Within the reigns of Asa and Baasha occurred the invasion of Judah by Zerah the Ethiopian (2 Chron. xiv.), and the invasion of Israel by Ben-hadad of Damascus, at the instance of Asa (2 Chron. xvi.).

House of Omri.—The year 47 A. Div. was both the second year of Elah and the first year of Omri, whose reign began 12 years before the thirty-eighth of Asa; though it was variantly counted as beginning with the thirty-first year of Asa, which date is, perhaps, that of the death of Omri's rival, Tibni. Since the dynasty of Omri came to an end A. Div. 90 (see below), and the oppression of Moab by this dynasty lasted, according to the Moabite Stone, 40 years, Omri's conquest of Moab occurred not later than 51 A. Div., the year of this second date for his accession. Inasmuch as his great grandson, Ahaziah of Judah, grandson of Ahab and Athaliah, was 22 years old when he ascended the throne, A. Div. 90 (2 Kings viii. 25, 26), the marriage of Ahab with Jezebel must have occurred, not, as many imagine, after Ahab became king, but in the earliest years of the reign of Omri; the three children of Ahab and Jezebel—Athaliah, Ahaziah, and Joram—all named for Jehovah, were all probably born during Omri's reign. Jeroboam and Baasha had maintained hostilities against Judah; the contrary is implied of Omri. The Bible account of this monarch is very scanty, but when we notice the facts just mentioned, as well as those which lie more on the surface, we see that he is sketched as a man of great ability, conciliating Phœnicia by marriage alliance, and Judah by religious professions, and by the making of a common interest, and perhaps inspiring the kingdoms of Israel and Judah with thoughts of future reunion and reaggrandizement.

Omri was succeeded by Ahab in 58 A. Div., the thirty-eighth year of Asa, the year being counted both as the twelfth of Omri and as the first of Ahab. From his accession Ahab was beaten upon by two opposing currents. On the one hand, both right and interest required him to affiliate more and more closely with the purer forms of the religion of Jehovah and with the house of David; on the other hand, he was Jezebel's husband. It turned out that the woman had more power with him than his interests or his conscience. As early as the accession of Jehoshaphat, at the close of the fourth year of Ahab, A. Div. 62 (1 Kings xxii. 41), the relations of the two kingdoms had become strained by reason of the growing power of Baal in Israel (2 Chron. xvii. 1–4). Five or six years later, however, the ties between the kingdoms were strengthened by the marriage of Jehoram, heir to the throne of Judah, to Athaliah, daughter of Ahab. The date of the marriage is fixed, within narrow limits, by comparing the ages of this Jehoram and of their son Ahaziah at their respective accessions (2 Kings viii. 17, 26). The marriage probably seemed at the time to be a triumph for the lovers of Jehovah. It actually turned out to be the reverse. Through it the Baalite party established themselves strongly in the court of Judah. In Israel they were strong enough to attempt the extirpation of the worshippers of Jehovah (1 Kings xviii. 4, xix. 10).

Elijah.—At this point Elijah appears upon the scene. The slaughter of Baal's prophets at Carmel has the moral character of a decisive battle, fought to show that the adherents of Jehovah were not to be slaughtered with impunity (1 Kings xvii., xviii.). From this time the religion of Jehovah held its own in the politics of the Northern Kingdom, but the religion of Baal, in spite of Jehoshaphat's efforts, more than held its own in the politics of Judah. Ahab was succeeded by his son Ahaziah, A. Div. 78, the seventeenth year of Jehoshaphat, and he by his brother Joram, the eighteenth of Jehoshaphat, A. Div. 79 (1 Kings xxii. 51; 2 Kings iii. 1). The year 78 is counted to both Ahaziah and Ahab, and the year 79 to Ahab, Ahaziah, and Jehoram. It follows that Ahaziah's reign was a co-reign with that of Ahab until some time in the year 79, and that he died and was succeeded by Joram before the close of that year. For some reason an Israelite annalist counts Jehoram of Judah as king during these two years (1 Kings i. 17), though the date when the permanent reign of Jehoram began, four years before the death of Jehoshaphat, is given as the fifth of Joram of Israel (2 Kings viii. 16). Just at the beginning of the twelfth year of Joram, Jehoram was succeeded by his son Ahaziah. This same year, 90 A. Div., Jehu overthrew the dynasty of Omri, slaying the kings of both kingdoms, extirpating Baal from the Northern Kingdom, and seating himself on the throne (2 Kings ix., x.). At the same date the Baalite Queen Athaliah seized the throne of Judah (2 Kings xi.). The year 91 A. Div. is counted as the first year alike of Jehu and Athaliah, though both were on the throne during some part of the previous year.

Assyria.—Meanwhile a new element had entered into the history of Israel. Shalmanezer II. says that he made victorious expeditions to the Lebanon country in both his first and his second years; that in his sixth year he defeated Ben-hadad, who had Ahab for one of his allies; that he defeated Ben-hadad again in his tenth, eleventh, and fourteenth years; that he cut cedars in Lebanon in his seventeenth year; that he defeated Hazael and received tribute from Jehu in his eighteenth year, and that yet later he treated Syria and Phœnicia as tributaries. His sixth year, therefore, must have been the twenty-first of Ahab, A. Div. 78, and his eighteenth year the accession year of Jehu, A. Div. 90. We have here, therefore, an exact synchronism between the dates of the Bible and those of the Assyrian Canon. Ahab's victories over Ben-hadad must have preceded 78 A. Div. (1 Kings xx.), while his defeat at Ramoth Gilead was early in A. Div. 79 (1 Kings xxii.). This latter year and the years that followed it were years of wars and dangers for Judah, fomented, perhaps, by Assyrian intrigue (2 Chron. xx.).

Assyrian and Hebrew Chronology.—From the eighteenth year of Shalmanezer to the accession of Sargon the Bible seems to count about 51 years more than are numbered by the existing copies of the Assyrian Eponym List. In treating of this difference, it is illogical to assign more weight to the negative testimony of the Assyrian tablets than to the positive statements of the Books of Kings. If we count the Biblical dates for the reigns of Jeroboam II. and Uzziah from the years of the birth of those kings, instead of from their accessions, it is possible to make the Biblical numbers exactly agree with the Assyrian Canon as it now stands, and the coincidence is a reason of much weight for adopting this view of the chronology. Either this view of the matter, or the view that the Assyrian Canon has an omission in this part of it, fit reasonably well most of the facts now known. Better knowledge will come with the discovery of more evidence. Meanwhile, notwithstanding some apparent discrepancies, the Assyrian records essentially agree with the Biblical. This fact reduces the differences of opinion in regard to the Biblical narratives from this point to within narrower limits, and renders it unnecessary to deal much with details in treating of the remainder of the history.

House of Jehu.—The dynasty of Jehu consisted of Jehu himself, Jehoahaz, Jehoash, Jeroboam II., and, after an interval, Zechariah, who reigned but six months. The reigns in Judah for the same time were those of Athaliah, Joash, Amaziah, and Uzziah. At the accession of Jehu, the king of Assyria says that Hamath, Syria, Israel, and Phœnicia were tributary to him. Rimmon Nirari, who died some 60 years after Jehu came to the throne, adds Philistia, Edom, and other neighboring countries to this list of tributaries. For the first two-thirds of this sixty years both Israel and Judah, as we are informed in Kings, suffered terribly from Hazael of Damascus. After that, Israel defeated Ben-hadad, the son of Hazael, and a little later, under Jeroboam II. and Uzziah, Israel and Judah are in practical accord, with a territory extending from Hamath to the eastern arm of the Red Sea. According to the shorter cast of the chronology, this condition of things was brought about suddenly, and lasted but a few years; according to the longer cast, it occupied more time.

Overthrow of the Kingdom of Israel.—Shallum, who conspired against Zechariah, the last of the dynasty of Jehu, was himself speedily overthrown by Menahem. As the Northern Kingdom draws to a close, the Israelite records, the Books of Amos and Hosea, for example, represent Israel as intriguing with Assyria; the Assyrian records represent the countries which had been tributary, as far to the north as Hamath, as in alliance with Uzziah, and as needing to be reconquered by Assyria. Then the Bible gives account of the interference by Pul in the days of Menahem (Pul was doubtless Tiglath Pileser, but not yet on the throne as king), by Tiglath Pileser in the days of Ahaz, and by Sargon and Sennacherib in the times of Hezekiah. Sargon says that he captured Samaria in his accession year, that is, the year before his first year, B. C. 722. He further says that he defeated Sebech, king of Egypt, coming to the rescue of Samaria, two years later, in B. C. 720. If the three years' siege of Samaria began in this year, the final capture and deportation were in 718 B. C.

Overthrow of the Kingdom of Judah.—We must not delay upon the history of Manasseh, of Josiah, or of the later kings of Judah. We need to notice, however, that the carrying of the Jews into exile by Nebuchadnezzar was not an event which should be dated in any one year, but a succession of events extending through twenty-four years. The first deportation by this king which is mentioned with a date occurred in his accession year, the year before his first year, the third year of Jehoiakim (Dan. i. 1); the last was in the twenty-third of Nebuchadnezzar. At least five other instances are given with dates, and how many are left undated we do not know (2 Kings xxv.; 2 Chron. xxxvi.; Jer. lii., etc.). The exiles mentioned in connection with these instances are but a few tens of thousands in all. They do not account for the vast numbers of the Jews who are found in every part of the empire in the Persian period. To explain where these vast numbers came from, we need to remember that Tiglath Pileser and Sargon deported large colonies from Northern Israel (2 Kings xv. 29; 1 Chron. v. 6, 26; 2 Kings xvii., xviii., and Annals of Sargon), and that Sargon, Sennacherib, and Esar-Haddon did the same from Judah (2 Chron. xxix. 9; xxx. 9; xxxiii. 11; Ezra iv. 2; Annals of Sennacherib). The numbers mentioned by Sargon and Sennacherib are vastly larger than those mentioned in connection with Nebuchadnezzar. It is to be presumed that these earlier exiles retained their Israelite institutions, and often received the later exiles as welcome additions to their communities.

The third period of Israelitish history closes with the Burning of the Temple, or, more strictly, with the captivity of Jehoiachin, eleven years before the burning of the Temple, when the civilization and the state were both practically broken up.

Prophetic Books.—Turning to look at the institutions of the period, we notice first, that it witnessed the beginning and development of a new type of sacred literature, the Books of the Discourses of the Prophets. Two groups of these belong to this period, that in which Isaiah is the central figure, and that in which Jeremiah is central. To the first of these groups belong Obadiah and Joel, probably, and the second part of Zechariah, with Amos, Hosea, Isaiah, Micah, and Nahum. To the second group belong Habbakuk, Jeremiah, Lamentations, and Zephaniah. (For an account of the questions concerning these books, see articles on PROPHETS and ISAIAH.) The theory that these are the beginnings of Israelite literature, or even of Israelite sacred literature, is as distinctly contrary to all the probabilities in the case as it is to the statements of that literature. The external evidence against this theory has of late been growing, year by year. It is now known that there was an extensive and varied literature in Egypt, long before Moses, and another in Babylonia before the times of Abraham. Assyriology proves that the allegation that the historical sense was lacking in these early times is the reverse of the truth. The antecedent probabilities prepare us to accept as true whatever apparently well-grounded statements of fact we may find concerning a Hebrew literature of early date; provided, of course, that such statements are consistent, and are not contradicted by critical phenomena. In regard to the early literature, or in regard to other historical facts, it is admitted that if the books of prophetical discourses contradict the historical books, the former are to be regarded as the more trustworthy, on the ground of their being contemporaneous writings; but in any alleged case of this sort, the contradiction must be proved, and not merely conjectured; statements which can be reasonably understood as consistent ought to be so understood and interpreted.

On these principles, it must be held that the age of Solomon inherited a body of sacred writings, largely legislative and historical, produced by Moses and Joshua, or under their influence. The word *Torah*, indeed, as used in the writings between Solomon and the Exile, can seldom or never be regarded as a specific term describing the present Five Books of Moses; it rather denotes the whole body of commands or other messages revealed by Jehovah through the prophets, and handed down and administered by them and by the priests. But *Torah* is often spoken of as written, and certainly included the writings so frequently mentioned as coming from Moses. It must be further held that the age of Solomon inherited another body of sacred writings—lyrical, ritual, and historical—produced in the lifetime of David, by David, Asaph, Heman, Jeduthun, Samuel, Gad, and Nathan; and that such of these men as survived David, together with Solomon himself, Shemaiah, Ahijah, Iddo, continued the production of similar literature (see Concordance); that like work was done in the following generations by the successions of men known as the Sons of Asaph and the Sons of Korah, and by such men as Jehu the son of Hanani; that in Hezekiah's time something was accomplished in the way of collecting and supplementing earlier works (Prov. xxv. 1); and that the line of difference of literary character, which separates the post-exilic writings from the pre-exilic, was drawn before the death of Jeremiah. One who holds these things to be true will be likely also to hold that Solomon wrote Canticles; that he also wrote Proverbs, the last chapters being added in the days of Hezekiah; that the times of Hezekiah, next to those of David, were prolific in Psalms; that the Book of Job is of the same date with that of Proverbs; that the Books of Kings, except the last section, which differs in literary character from what precedes it, were completed in the lifetime of Jeremiah.

Kings and Samuel.—Since the Books of Kings begin with narrative documents bearing the names of Nathan, Shemaiah, and Ahijah, while the Books of Chronicles refer to the writings of these prophets as sources for the history; since, also, these parts of Kings bear strong resemblances to the Books of Samuel, while the Books of Kings as a whole differ greatly in literary character from the Books of Samuel; and since other like phenomena present themselves, we are justified in inferring that the Books of Kings are made up largely from sources which were contemporaneous with the events described.

High Places.—The Scriptures certainly represent that the Pentateuchal institutions, as a system, were in operation in Israel during Solomon's reign (1 Kings ix. 25, etc.); and that, from then onward, they constituted the standard of orthodoxy in Israel. The assertion that image-worship was a correct part of the ritual of Solomon's Temple is not sustained by the passages cited for that purpose. That the high-place worship was in existence up to Josiah's time is a fact;

it is not a fact, so far as appears, that it was ever regarded as orthodox. That the high places existed, and were not removed, is counted a blot on the record of Solomon and of each of his successors up to Hezekiah (1 Kings xi. 7, xv. 14, etc.). After the separation of the Northern Kingdom had become an acplished fact, rendering it impossible for worshippers there to frequent the altar at Jerusalem, other altars to Jehovah were there recognized, as previously in the days of Samuel (1 Kings xviii. 30, xix. 10); but the shrines at Bethel and Dan, the rivals of Jerusalem, are never mentioned otherwise than with abhorrence. Excepting for a few years, in Ahab's time, it may be true that Judah suffered as much from Baalism as Israel; spiritually, the religion of both kingdoms was always imperfect; but no orthodox national cultus is recognized for the Northern Kingdom, nothing which corresponded to the Temple cultus at Jerusalem. The finding of the Book of the Law in the Temple, in Josiah's time, was not the discovering of legislation previously unknown or unfamiliar, but was an incident which served as an occasion for a fresh outburst of religious earnestness, in a court which had already been for some time engaged in the work of reform.

IV. *Fourth Period. From Zedekiah's Captivity to the Death of Nehemiah. The Sanctuary after the Burning of Solomon's Temple.*

The fourth period of Biblical history begins with the people of Israel in exile in Babylonia, Egypt, and perhaps other countries. The Books of Jeremiah, Ezekiel, and Daniel give us glimpses of three different groups of the exiles, widely unlike in their circumstances. Fifty years after Nebuchadnezzar burned the Temple, came the first Return, under Cyrus. The accounts of it presuppose that the Jews were then living in many parts of the empire, and that many of them had wealth and influence. When we call to mind, on the one hand, the relations of the Greeks to the coasts of Asia Minor, to Egypt, and to the Phœnicians, and, on the other hand, the relations of the successive Assyrian, Babylonian, and Persian kings to Phœnicia, Egypt, Cyprus, and Asia Minor, it becomes evident that the contact of Jews with Greeks must have begun at least as early as these fifty years, instead of in the times of Alexander the Great and his successors. We are not surprised, therefore, at finding Greek words in the Biblical books of this period. In the days of Xerxes and Esther we still have the picture of an insignificant colony of Jews in Palestine, while Jewish citizens are numerous and respectable in every province from India to Ethiopia.

Ezra and Nehemiah.—At this very time there was in Babylonia a wide-spread interest in the study of the sacred books, represented in the person of Ezra the priest, the scribe of the law of the God of Heaven. We have a glimpse, likewise, of an institution described as "the place Casiphia," able, on a few hours' notice, to detail some hundreds of Levites and other Temple servants, to make the long journey with Ezra to Jerusalem (Ezra viii. 17). Some 80 years after the return of Zerubbabel, nearly 60 years after the completing of the Temple by him and Jeshua, we find Ezra going to Jerusalem, taking with him these trained Temple servants, as well as the Book of the Law. Then for 25 years follows the struggle of Ezra and Nehemiah to re-establish the ancient institutions; a struggle in which they are no longer hindered by idolatry, but by greed, scepticism, and a disposition to form non-Jewish alliances. Then the curtain drops, and beyond it we have a glimpse of only a few isolated and undated facts, imperfectly supplemented from extra-Biblical sources. Nehemiah returned to Artaxerxes about 432 B. C., probably yet a young man, after his 12 years of service as governor at Jerusalem. It soon became evident that his work was not finished. The Temple was poor, its ministers unprovided for, and all things relapsing into the old disorder (Neh. xiii. 10, etc.; Mal. i. and ii.). The work could not go on without Nehemiah, and he returned to it. How long he remained we are not informed; there is no absurdity in supposing that it may have been 40 or 50 years, or even longer. When the curtain again lifts, in the beginning of the Grecian period, the work which 25 years had hardly sufficed to begin presents itself to our view as completed, and on a firm foundation; the Mosaic legislation is established; the Temple and its service, though not always creditably managed, are well provided for and magnificent; Samaria and Jerusalem are differentiated, and Israel is separate from the mixed peoples.

Thus the Divine purpose was accomplished. When kingly government, by which the people had vainly sought to establish the nation, had plunged them in seemingly irretrievable ruin, the true spiritual life, which it had been the design of the Mosaic Law and its institutions to create and foster, began to manifest itself more clearly than ever before. The national conscience, aroused by affliction, gave heed to the voice of the prophets, and returned with zeal to the Covenant made at Sinai.

The Old Testament Completed and Arranged.—The accounts represent that prophets were numerous throughout the Fourth Period (Ezra v. 1; Neh. vi. 7, etc.). Within it were written the several sacred books already mentioned, with the later Psalms, the first part of Zechariah, Haggai, and Malachi. Internal evidences also place here the books of Ecclesiastes and Jonah, written on topics belonging to the times of Solomon and of Jeroboam II. The Books of Kings and of Jeremiah were supplemented, the five books of the Psalms arranged into a collection, the Books of Chronicles compiled. By the accomplishing of these several facts, with or without official action thereon, the Old Testament became a complete body of sacred writings. Half a dozen slender but independent items of evidence combine to fix the date of this as within the lifetime of Nehemiah, and before the extinction of the line of prophets.

The prophets and worthies of this period, from Daniel on, are included in the succession of men known as the Men of the Great Synagogue. Whatever may be thought concerning the Great Synagogue as an organization, there can be no doubt that the men called by this name existed, nor that they performed many of the labors attributed to them. The succession of the Men of the Great Synagogue lasted to Simon the Just, but the spirit of prophecy is not held to have been manifested later than Nehemiah and Malachi.

It does not fall within the province of this supplementary article to consider the later periods of Israelite history.

The times are very prolific in literature directly or indirectly bearing on the history of Israel. It is impossible to mention more than a few works among many. William Smith's *Illustrated History of the Bible* (1871) is a passably good popular presentation of the whole subject from the traditional point of view. Full and able discussions of particular questions, from different points of view, are found in most recent commentaries on the Bible. Quite noteworthy among these is the series of papers in the successive volumes of the *Pulpit Commentary*, edited by Canon Spence and the Rev. J. S. Exell. Alfred Edersheim's *Life and Times of Jesus the Messiah* (1884) contains a particularly full and satisfactory digest of the materials from Rabinical sources on the history from the Exile to the Christian era. James Sime's *The Kingdom of All Israel* (1883) is a monograph, from a conservative point of view, on the times from Joshua to David. Among chronological works may be noticed Victor Floigl's *Chronologie der Bibel* (1880) and the work of Friedrich Delitzsch on the Assyrian Eponym Canon, which is a year or two later than George Smith's *Assyrian Canon* and uses some material that Smith omits. Neither Floigl nor Delitzsch would defend the numerals given in the Bible. The chronological views followed in this article are explained, in parts, in the *Presbyterian Review* for April, 1880, and in the *Old Testament Student* for January, 1884.

Of especial interest are the archæological discoveries continually being made, especially in Assyria and Babylonia. The article on "Cuneiform Inscriptions," in the Schaff-Herzog *Encyclopædia of Religious Knowledge*, gives a very full and valuable table of the literature of Assyriology. The eleven little volumes, entitled *Records of the Past* (1873–80), with Smith's *Canon* and his *Assyrian Discoveries* (latest edition), constitute a valuable though not always trustworthy apparatus for studying the history of Israel in synchronism with that of other peoples. Among the more elaborate works are: By Eberhard Schrader, *Keilinschriften und Geschichtsforschung* (1878) and *Die Keilinschriften und das Alte Testament* (1883); by Friedrich Delitzsch, Paul Haupt, and their associates, the successive parts of the *Assyriologische Bibliothek*, including materials concerning Israel, as concerning other peoples, some parts already published and other parts in preparation. In the line of Egyptian exploration, *The Store-City of Pithom*, by Edward Naville, and *Tanis*, by W. M. Flinders Petre, bear more directly upon the history of Israel than most of the Egyptian work hitherto done. Prof. H. S. Osborn's *Chart of the Books of the Bible* (1886) is an attempt to present to the eye both the historical material found in the Bible and that drawn from explorations and other sources. (W. J. B.)

See Vol. XIII. p. 443 Am. ed. (p. 434 Edin. ed.).

ITALY. On Dec. 31, 1884, the population was 29,361,032, an average of 257 to the square mile, the total area being 113,980 square miles. In 1881 there were 71,138 more males than females; of foreigners there were 59,956. In 1884 the births numbered 1,169,006; deaths, 818,628; marriages, 239,514. In 1881 it was estimated that 1,032,392 Italians were living outside of Italy, of whom 240,733 were in France, 43,875 in Austria-Hungary, 62,203 in Africa, 7625 in Asia, 254,388 in the Argentine Republic, 170,000 in the United States, 82,196 in Brazil, 40,003 in Uruguay, and 10,000 in Peru. Following is a summary of emigration for the five years, 1880 to 1884:

Destination.	1880.	1881.	1882.	1883.	1884.
Austria-Hungary	20,493	20,503	20,430	16,787	32,696
Switzerland	13,074	10,245	8,476	6,348	5,509
France	43,172	50,735	53,037	46,768	38,523
Germany	4,277	5,793	7,662	12,376	4,271
Total for Europe	84,224	92,107	93,930	98,665	87,558
Total for Africa	2,408	2,654	7,773	6,123	3,123
United States and Canada	5,756	11,868	18,669	21,337	10,347
Argentine Republic	13,345	16,947	24,526	26,075	34,016
Total for America	33,080	40,871	59,695	63,388	55,467
Grand total	119,901	135,832	161,562	169,101	147,017

On Dec. 31, 1881, the population of the ten principal cities was:

	City.	Commune.		City.	Commune.
Naples	463,172	494,312	Genoa	138,081	179,515
Milan	295,543	321,839	Florence	134,992	169,001
Rome	273,268	300,467	Venice	129,445	132,826
Turin	230,183	252,832	Bologna	103,998	123,274
Palermo	205,712	244,991	Catania	96,017	100,417

Occupations.—The number of men, women, and children engaged in the principal occupations in 1884 was: agriculture, 9,169,215; forestry, fishing, etc., 112,858; mining, 64,817; industries, 4,494,838; commerce, 284,938; transportation, 321,693; *rentiers* and pensioners, 985,278; employés and domestics, 760,603; national defence, 160,155; civil administration, 170,703; religious, 132,467; justice, 28,250; laborers, 134,070; prisoners, beggars, etc., 134,800; without specified occupations, 8,456,698.

Finance.—The budget for the fiscal year ending June 30, 1886, is as follows in *lire:*

	Ordinary.	Extraordinary.	Total.
Receipts	1,456,173,074	240,234,848	1,696,407,922
Expenses	1,388,753,117	318,559,652	1,707,312,769
	Surplus 67,419,957	Deficit 78,324,804	Deficit 10,904,847

The expenses are divided among the following departments: ministry of the treasury, 751,470,712; finance, 179,584,916; grace, justice, and public worship, 33,886,362; foreign affairs, 7,621,568; public instruction, 35,159,742; interior, 64,052,193; public works, 295,544,494; war, 249,793,773; marine, 78,474,647; agriculture, 12,724,362. The interest charges of the *public debt* on July 1, 1885, were as follows: consolidated debt, 446,144,995; permanent interest owed to the Holy See, 3,225,000; debts separately inscribed, 24,661,910; various, 46,233,782; floating, 10,063,000; total, 530,328,687 *lire*. The Italian debt, if capitalized, would now amount to about $2,200,000,000.

Commerce.—The following table gives in millions of *lire* the imports and exports of Italy in 1883 and 1884:

	Import.		Export.	
	1883.	1884.	1883.	1884.
Articles of food and drink, tobacco, etc.	295.2	320.3	346.5	320.6
Raw material	432.7	425.6	470.9	447.3
Manufactured articles	372.4	390.2	177.9	146.5
Various articles	182.6	177.9	186.3	151.
Precious metals	97.4	29.8	18.3	31.
Total	1380.3	1343.8	1199.9	1096.4

The traffic with the chief countries in 1884 was as follows, in millions of *lire:*

	Export.	Import.
France	425.2	289.3
England	89.7	300.2
Austria	111.3	206.1
Switzerland	129.1	75.2
Russia	22.8	50.8
United States and Canada.	55.1	60.2
Germany	109.3	110.7
Central and S. America	31.2	25.5
Turkey, etc	16.	34.5
Other countries	106.7	191.3
Total	1096.4	1343.8

The Italian merchant marine (Jan. 1, 1884) consisted of 7287 ships, with 971,001 tonnage and 189,162 seamen. During the year 1884 there were 104,369 entries to (tonnage, 16,717,679) and 103,987 departures from (tonnage, 16,666,031) Italian ports.

Army.—The Italian military system is based upon the German. Every year a levy is made of young men of 21. About 70,000 of these are added to the standing army, and serve 3 years if in the infantry and 4 years if in the cavalry; about 60,000 are entered in the second category and serve only 6 months. In the reserves the service lasts 5 years; in the mobile militia 4 years for infantry and 5 for cavalry. The second category, after their 6 months' service, pass immediately into the reserve and mobile militia. After serving the specified time all are drafted into the territorial militia until their 39th year. Every native is liable to military service, but those who pass an examination serve only one year. There are 12 army corps, of which the commands are stationed at Turin, Alessandria, Milan, Piacenza, Verona, Bologna, Ancona, Florence, Rome, Naples, Bari, and Palermo. The kingdom is divided into 24 military divisions. The *permanent army* consists of 96 regiments of the line, numbering (Jan 1, 1885) 250,085 men; 87 military districts, 371,959 men; 12 regiments bersaglieri, 41,410 men; 6 regiments of the Alps, 22,430 men; cavalry, 26,769; artillery, 84,389; engineers, 19,803; carabinieri, 21,894; military instruction, 3078; sanitary, 9727; administration, 3555; invalids, 578; various special departments, 3375; officers (active), 13,610; complementary, 3252; of the auxiliary service, 1861; reserve, 3428; total, 881,203. The *mobile militia* consists of 362,353 men, of whom 313,407 are infantry and bersaglieri; 3821 Alpine; 29,414 artillery; 6034 engineers; various, 9977. The *territorial militia* numbers 1,156,522, making the estimated grand total of fighting men in Italy, 2,400,078.

Navy.—The Italian navy has been rapidly developed, it being the policy of its directors to provide a few monstrous iron-clads (see IRON-CLADS)—a policy which was attacked in the Chamber in 1882 and 1883. On Jan. 1, 1885, the fleet was as follows: first-class, 17 (7 in construction); second-class, 14 (4 torpedo boats in construction); third-class, 15 (3 in construction); total, 46. Besides these, 89 transports and other vessels. The total tonnage was 229,770; number of guns, 205; horse-power, 237,020; men, 11,427, with about 4000 officers, engineers, gunners, etc. The dimensions of the seven first-class ships are given in the following table:

	Guns.		Horse-power.	Displacement, tonnage.	Armor, thickness at water-line.
	Number.	Weight in tons.			
Duilio	4	100	7,700	10.570	22
Dandolo	4	100	7,500	10,570	22
Italia	4	100	18,000	13,700	19
Lepanto	15	4			
Andrea Doria, Ruggiero di Loria, Francesco Morosini	4	100	10,000	10,000	18

General Facts.—Jan. 1, 1884, 9455 kilometres of *railways* were in operation, partly owned by the state. There were 28,506 kilometres of *telegraph*, the total length of the wires being 97,136 kilometres; 1848 telegraph offices; 6,536,757 telegrams forwarded in 1883. There were 3609 *post offices* in the kingdom and 5 outside of it; number of letters and postal cards, 187,856,020; printed matter, 169,566,540; postal orders, 4,248,569, of the value of 549,125,130 *lire;* receipts, 35,461,733 *lire;* expenses, 30,123,293 *lire.* Italy comes next to France as a producer of wine, the average annual yield being 605,000,000 gallons. The average yield of olives is 9,000,000 bushels; of oil, 3,000,000 cwt. In 1882 the raw product of silk was 5,214,000 lbs. Sulphur is the chief mineral product (359,540 tons in 1880). Of the total area of Italy 86.9 per cent. is productive; 12 per cent. of the total area is under forest; 36 per cent. under culture; 12,000,000 acres are under wheat (average yield, 140,000,000 bushels); 5,000,000 acres are under vineyards; 2,200,000 acres under olives; and 1,225,000 acres under chestnuts.

Recent History.—Since 1880 Italy has been chiefly occupied with two very important internal measures. The first related to the financial system of the kingdom, and resulted in the resumption of specie payments; the second related to the electoral system, and resulted in the adoption of what is practically universal suffrage, and of the vote by *scrutin de liste.* When Parliament reassembled (Jan. 24, 1881), the discussion of the bill for the abolition of legal-tender notes was taken up; on February 23 it passed the House by 266 to 27; on April 5 it passed the Senate, and arrangements were immediately made between the National Bank of Italy and Messrs. Baring and Hambro for supplying the necessary specie. Magliani, minister of finance, made an admirable report, showing a surplus of 28,250,000 *lire*, but advised a strict economy in order to provide for the wiping out of the forced currency and of the grist tax. Nevertheless, 50,000,000 *lire* were granted for public works in Rome, it being urged that these would assure Italians and the world that there was no thought of removing from that capital, in spite of the hints and intrigues of the clericals. On the night of July 12, as the body of Pius IX. was being taken from St. Peter's to San Lorenzo, a mob attacked the procession, with shouts of "To the river," "Down with the clericals," "Viva Garibaldi." This outbreak increased the ill feeling between the Italians and the supporters of the Vatican, even leading to the proposal that the laws of guarantees should be abolished. Meanwhile the agitation for the extension of the suffrage proceeded; the friends of the Cairoli ministry advocating it, whilst the opposition, led by Minghetti, Sella, and Bonghi, opposed it. The bill did not pass the House until June 29 (by 202 to 116), and the Senate, where it was substantially amended, until Dec. 5 (by 145 to 55). The encroachments of France in Tunis alarmed and exasperated the Italians, who had been on intimate terms with the Bey for many years, and by whom the expectation had long been tacitly cherished that if any European government were to occupy Tunis it must be the Italian. An attempt to overthrow Cairoli, the premier, proved successful, owing to a coalition of the Old Right, the Extreme Radicals, and the followers of Crispi and Nicotera; but Depretis and Sella, who were in turn summoned by the king, had difficulty in forming a new cabinet. The deadlock was broken by the substitution (May 27) of Depretis for Cairoli, most of the former cabinet having consented to keep their portfolios. The treaty of the Bardo (May 13) dissipated all doubt as to the real object of France in her Tunisian campaign. Italy could only protest at the time, but she was all the more ready to follow a foreign policy hostile to the French. The opportunity soon offered. On Nov. 10 King Humbert and Queen Marguerite visited the Emperor Francis Joseph at Vienna, and before the end of the year the triple alliance, of which Germany, Austria, and Italy were the members, was known to exist, although its terms have never been published. General Cialdini, ambassador at Paris, and Maccio, at Tunis, were recalled, and no haste was made to appoint their successors. Early in 1882 the electoral reform bill was finally passed (217 to 63), and on Jan. 22 was signed by the king. It conferred the franchise on all Italians, by origin, birth, or naturalization, over 21 years of age, provided they could read and write, and had passed through the obligatory elementary course prescribed by law. Exceptions were made in the case of members of academies of science, letters, or arts, of chambers of commerce, of agricultural associations, teachers and professors, university graduates, lawyers, all members of the army and government employés, etc.; also, those are exempted who pay an annual tax of 19.80 *lire.* The second electoral reform was the adoption of the system of *scrutin de liste*, which passed the Senate April 28. A bill for dividing the country into large electoral districts, and for providing for the representation of minorities, was introduced at this session. Magliani, minister of finance, presented another satisfactory budget. Increased appropriations were voted for the construction of forts on the frontier and coast. A discussion of the condition of the navy brought out heated opposition to the policy of Admiral Acton, minister of marine.

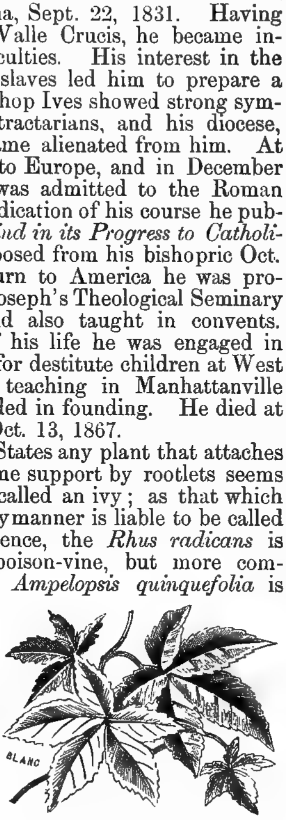
Foreign affairs kept the Italians in a state of uneasiness. The disagreement between England and France in the dual contest of Egypt, the rebellion of Arabi, and the English campaign occasioned conflicting debates as to the policy Italy ought to pursue; but Mancini, minister of foreign affairs, decided to imitate Germany and Austria, and remain neutral. In the preceding summer a coaling station had been established at Assat, on the Red Sea, for the steamers of the Rubattino line. The Italian government now officially took possession of Assat, and recognized it as a colony. During the summer of 1882 the campaign for the new elections began, and the elections themselves (October 29) returned an overwhelming majority for the Depretis government, viz., Ministerialists, Left and Centre, 320; Right, 100; Dissidents and Republicans, 40 each. The election of Coccapieller, ex-jockey, libeller, and blackguard, by the Radicals in one of the Roman districts caused a temporary stir. At the ensuing session Falleroni, a Socialist deputy, refused to take the oath of allegiance. The premier thereupon introduced a bill declaring the seat vacant of any deputy who fails to take the oath within two months after his election or who refuses to do so. The bill was passed with but slight opposition. During 1882 two noteworthy events were the death of Garibaldi at Caprera, June 2, which was the occasion of very general demonstrations of regret, and, in the autumn, destructive floods in the valleys of the Po and its tributaries. On March 1, 1883, the king signed the decree for the resumption of specie payments. The budget again showed a satisfactory balance, and Magliani spoke hopefully of the increase of Italy's resources. Some of his statements were contradicted, but the opposition did not feel strong enough to attack the financial management of the government. Mancini's foreign policy, however, was criticised, in that he had not accepted England's invitation to co-operate in the reconstruction of Egypt. Depretis, the premier, gradually established more friendly relations with the Conservatives, and when a vote (May 18) of confidence was reached his majority was 348 to 29. Two members of his cabinet—Baccarini, minister of public works, and Zardanelli, minister of justice—were too thorough-going Radicals to favor the altered policy, and they therefore resigned. The external affairs of Italy during 1883 were of secondary importance. Diplomatic courtesy was renewed with France, and the value of the triple alliance was extolled by the minister of foreign affairs, who further denounced the schemes of the Irredentists as illogical and unpatriotic. It would be as reasonable, he said, to demand the restoration to Italy of Corsica, Malta, and the Swiss Canton of Ticnio, as that of the Trentino and Trieste. The Irredentists nevertheless published several newspaper attacks upon Austria, and tried to elevate Oberdank, who was executed for attempting to assassinate the Austrian emperor, into a martyr patriot. A frightful earthquake occurred on the island of Ischia at 9.50 P. M. on July 28, killing more than 2000 persons and wounding about 600. The village of Casamicciola was completely destroyed. King Humbert visited the sufferers, for whom an international subscription amounting to 3,000,000 francs was raised, besides aid from the government. A bill for the reclamation of the Roman Campagna was introduced by Berti, minister of agriculture, during this year. Early in 1884 the papal party received a severe blow by the passage of a decree by the court of cassation that the property belonging to the Propaganda in Italy should thenceforth come within the scope of the general law of the disestablishment of church property. The result of this decree was the levying of a tax of 30 per cent. on propagandist revenues, in spite of the protest of the pope. In the Chamber the discussion of the higher education act weakened the ministry, and led to the resignation of Depretis, who, however, on March 23, consented to form a new cabinet, in which the chief change was the replacing of Bacelli by Coppino as minister of public instruction. The Clericals took advantage of prolonged quibbling among the Liberals over the budget and minor matters to strengthen themselves for the municipal elections, and were victorious at Genoa and Naples. During the month of June there was a slight flurry in the Chamber over the Franco-Moroccan difficulty, which, it was feared, would end as the Tunis affair had ended, by the aggrandizement of France. But Mancini pointed out that, since Italy had not gone to war over Tunis, she had no reason to do so over Morocco, and a vote of confidence was secured by the government. It was hinted that, when the proper time should come, Italy could annex Tripoli. Italy's relations with England became closer in the autumn, owing partly to the suspicious cordiality between Bismarck and Ferry, the French premier. England decided to send an expedition to relieve Gen. Gordon at Khartoum, and the Italian minister for foreign affairs favored the equipment of a force to occupy Assat. A discussion of government control of all the railways in Italy completed the year's parliamentary work. During 1884 Italy suffered from the most disastrous cholera epidemic for many years. The disease broke out at Toulon; was carried by refugees to Naples, where it spread rapidly; attacked likewise the frontier towns on the north-west, together with Genoa and many places in Tuscany. From July 15 to October 2 there were 15,000 cases and 10,000 deaths reported. At least 8500 died in Naples alone. The king visited the infected parts of Naples, and the Chamber authorized the appropriation of 100,000,000 *lire* for the sanitation of that city. This epidemic put a stop to travel and commerce, but did not impair the popularity of the international exhibition at Turin in October, nor the Phylloxera Congress. A tornado caused much damage at Catania, Sicily (October 7), and several avalanches early in 1885 devastated the mountain slopes of Piedmont. Noteworthy incidents of 1884 were pilgrimages to the tomb of Victor Emmanuel, in the Pantheon, in January, and the death of Quintino Sella (March 14). The year 1885 was uneventful, the chief episode being the pursuance of a policy of interference in Egypt. Mancini, partly, perhaps, to compensate his countrymen for their displeasure at the aggrandizement of France in Tunis, and partly to put Italy on better terms with England, fitted out an expedition to occupy part of the Red Sea littoral. The force was to consist of 35,000 men, but a much smaller number was sent. It occupied Massowah, and, but for the failure of the English under Wolseley to reach Khartoum before the capture and death of Gen. Gordon, it might have co-operated with England in subduing the Mahdi's followers east of the Nile, and have gotten a share of the spoils. The Porte protested against the expedition, which was so popular in Italy, however, that the protest was disregarded. "Italy will allow the Egyptian flag to remain side by side with the Italian flag at every occupied point," was the reply of the Italian foreign minister. But when the Italians found that there was no monetary advantage and hardly any glory in Mancini's colonial scheme, they speedily attacked it. In the Chamber, on May 14, the ministry barely escaped defeat by a majority of 4, and Mancini resigned, his position in the foreign office being filled by Depretis, the prime minister. Opposition to the government continued, and on June 16 a vote of confidence in the government was carried by only 3 votes. Depretis wished to resign, pleading his age as a reason for retiring from public life, but the king persuaded him to reconsider his purpose, and on June 29 a new ministry was announced. During the spring a slight commotion was stirred up by the refusal of the Italian government to receive Mr. Keiley, who had been appointed minister to Italy from the United States. There has been no improvement in the relations between the Quirinal and the Vatican in recent years. While the Italian government has gone steadily forward in its national policy, the pope has lost no occasion to protest against the "usurpation" of the papal territory, and there is no sign of a wish to compromise. Under his direction Clericals have taken a rather more open part in politics than under Pius IX. In 1882 the emperor of Austria would not return Humbert's visit because he could be properly received by the Italian king only at Rome; but if he went to Rome, he would be obliged to pay his respects to the pope, who intimated that he could grant no audience to the guest of Humbert. Educational measures are slowly improving the condition of the Italian masses, but illiteracy is still very great. In spite of the extension of the suffrage, the popular interest in public affairs, as evinced in the number of qualified persons who avail themselves of their right to vote, is as yet only moderate, but there has been a rapid increase in the number of economical works and a rapid development in manufactures. The very heavy taxation is the chief obstacle that now hinders Italian prosperity. (W. R. T.)

ITHACA, an incorporated town of New York, county-seat of Tompkins county, is near the southern extremity of Cayuga Lake, and on the Delaware, Lackawanna, and Western Railroad, the Utica, Ithaca, and Elmira, and two other railroads. It is largely engaged in manufactures, having 3 foundries, and producing guns, clocks, organs, stoves, steam-engines, agricultural implements, etc. The distribution of coal from the Pennsylvania mines is here an important business. Ithaca has 8 hotels, 2 national banks, a savings bank, a daily and 4 weekly newspapers, 14 churches, 8 schools, and a public library. Its most important institution is Cornell University (*q. v.*), founded by Hon. Ezra Cornell, the buildings alone costing over $1,000,000. The city is neat and picturesque, with streets well laid out. It is built in part on the slopes of the high hills that enclose the head of Cayuga Lake. The vicinity abounds in deep ravines and fine waterfalls. The city is lighted with gas and electric light, has water-works and 4 parks. The assessed valuation is $3,275,000, and the public debt $300,000. Its population in 1880 was 9105.

IVES, Levi Silliman (1797–1867), an American bishop, was born at Meriden, Conn., Sept. 16, 1797. Brought up on his father's farm at Turin, N. Y., he served for a year in the army during the war of 1812, then entered Hamilton College with a view of entering the Presbyterian ministry, but owing to ill-health did not graduate. He joined the Episcopal Church in 1819, took deacon's orders in 1822, and priest's orders in 1823. He then had charge of Trinity Church, Philadelphia, and in 1827 he removed to Lancaster, Pa., and afterwards to New York. He was consecrated bishop of North Carolina, Sept. 22, 1831. Having established a school at Valle Crucis, he became involved in pecuniary difficulties. His interest in the religious training of the slaves led him to prepare a catechism for them. Bishop Ives showed strong sympathy with the Oxford tractarians, and his diocese, though high church, became alienated from him. At length, in 1852, he went to Europe, and in December visited Rome, where he was admitted to the Roman Catholic Church. In vindication of his course he published *The Trials of a Mind in its Progress to Catholicism* (1854). He was deposed from his bishopric Oct. 14, 1853. After his return to America he was professor of rhetoric in St. Joseph's Theological Seminary at Fordham, N. Y., and also taught in convents. During the last years of his life he was engaged in establishing a protectory for destitute children at West Chester, N. Y., and in teaching in Manhattanville College, which he had aided in founding. He died at Manhattanville, N. Y., Oct. 13, 1867.

See Vol. XIII. p. 535 Am. ed. (p. 526 Edin. ed.).

IVY. In the United States any plant that attaches itself to some support by rootlets seems likely to be called an ivy; as that which climbs in any manner is liable to be called a vine. Hence, the *Rhus radicans* is known as poison-vine, but more commonly poison-ivy. The *Ampelopsis quinquefolia* is American ivy, or five-fingered ivy; and the *Ampelopsis tricuspidata*, an Asiatic species, very common in ornamental gardening, is styled Japan ivy. The *Bignonia radicans* is generally known as trumpet-vine, or trumpet-creeper, and sometimes as trumpet-ivy.



American Ivy (*Ampelopsis quinquefolia*).

It is not believed in the United States that the European ivy objects so much to hot and dry summers as to the dry atmosphere of our winter seasons. On the south exposures they are killed in winter sometimes, but only towards spring, when the warm sun causes a rapid loss of moisture. Wherever the winter atmosphere is damp it thrives well on the American continent. On the Pacific coast, notably at Victoria in British Columbia, it is in almost all gardens, and thrives even more luxuriantly than in Europe. In the mountain districts of Virginia also old churches and stone buildings are often seen as completely covered with the ivy as the ancient ruins of Europe.

The rootlets or stem-fibres are annual, as in the case of the poison-ivy and similar plants, as are the fibres of most plants that have their roots wholly under ground. And just as in the underground cases, where a few, getting more food and a better opportunity, become true and permanent roots, so the stem-rootlets of the ivy become permanent roots if they can get into earth or the decaying mortar of old walls. On smoothish surfaces the fibres die and lose their attachment before the new growth starts in spring. The ivy branches then hang, and, instead of the plant ascending the wall rapidly, it is regarded as unsuited to the climate. It is this fact chiefly that induces the rarity of ivy in American gardens, so often noted by Europeans. In more recent years it is planted with the *Ampelopsis.* This attaches itself to the walls by discs at the end of tendrils, but so firmly that though the tendrils die the attachment is not loosened. European ivy is then planted with it, and by its aid will climb rapidly the smoothest wall. The cultivation of this plant is becoming much more common since this practice has been adopted. For use in the decoration of rooms or hallways, growing in pots or tubs, it is one of the most popular of climbing plants in America. Thousands are sold annually in most of our large cities. Its shade-loving propensities render it remarkably well adapted for the purpose. (T. M.)

IZARD, Ralph (1742–1804), an American statesman, was born near Charleston, S. C., in 1742. He was educated at Cambridge, England, and having inherited a large fortune settled in London in 1771. At the approach of the American Revolution he withdrew to the Continent, and afterwards warned the British ministry of the perils of their course. He was appointed by Congress commissioner to the grand-duke of Tuscany. Though polished in manners and honest, he was passionate and unfit for diplomatic business. In 1780 he returned to the United States, assisted in procuring the appointment of Gen. Greene to the command of the southern army, and pledged his whole estate for funds needed by Congress. In 1781 he was elected to the Continental Congress, and he was U. S. Senator, 1789–95. He died at South Bay, S. C., May 30, 1804. His *Correspondence*, with a Memoir, was published by his daughter (1844).

His son, George Izard (1777–1828), was born near Charleston, S. C., in 1777. He received a classical education, and after making a tour in Europe was appointed lieutenant of engineers in 1794, which position he held also in the French army in 1796–97. After his return he had charge of the fortifications of Charleston harbor, and was aid to Gen. Hamilton. He resigned in 1803, but in 1812 was appointed colonel of artillery, and during the war with Great Britain was promoted to be major-general. In 1825 he was appointed governor of Arkansas Territory. He died at Little Rock, Ark., Nov. 22, 1828. He published his *Official Correspondence with the War Department* in 1814–15 (Phila., 1816).

J.

JACKSON, a city of Michigan, seat of justice of Jackson county, is 76 miles W. from Detroit, 197 miles E. from Chicago. Its population in 1880 was 16,105, and by the State census of 1884 was 19,136. It is on the Michigan Central, main line, with three branches extending to Mackinaw, to Grand Rapids, and to Niles; two branches of the Lake Shore and Michigan Southern Railway connecting with Toledo and Fort Wayne; and a branch of the Grand Trunk Railway of Canada. A railroad directly south to Cincinnati (one-third, in Ohio, now built) is also contemplated. These roads run lengthwise of the valleys named, where the Indian trails were 65 years ago.

The city has 10 and the railroads 7 bridges over Grand River, one railroad and 4 city bridges being of iron.

The State prison was located at Jackson in 1835. The convicts now number 770, and are principally employed by wagon and farming implement contractors.

There are 13 hotels, one national bank, three State banks and one private bank, three daily and six weekly newspapers.

The church buildings number 17, being 2 Baptist, 1 Freewill Baptist, 2 Roman Catholic, 1 Congregational, 1 Evangelical, 1 Lutheran, 3 Methodist, 1 African Methodist, 1 Free Methodist, 2 Episcopal, 1 Unitarian, and 1 Hebrew synagogue, a majority of which are substantial brick buildings severally costing from $10,000 to $70,000. There are also religious societies worshipping in public halls. The public schools occupy fifteen substantial brick buildings of an average value of about $10,000. There are also private schools maintained by the Roman Catholic and Lutheran Churches.

The city contains six flouring-mills, one wood-pulp- and two paper-mills, three corset-factories, four carriage-factories, three factories for milling machinery, six foundries and machine-shops, the Michigan Central Locomotive Works, a furniture-factory, a soap-factory, three planing-mills, and factories of underwear, corset steels, knitting machines, cigars, phaeton bodies, crackers, doors, sash, blinds and moulding, boilers and steam-engines, files, furnaces, wagons, farming implements, brooms, and boots and shoes at the State prison.

The city is located on both sides of Grand River, and except narrow spaces for the river at the southeast and north is mostly enclosed within a circuit of hills about 100 feet high, 2½ miles from north to south, and about 1½ from east to west, the better class of residences being on the hills. Numerous shade trees, fountains, and well-kept lawns add to the beauty of the somewhat irregular surface.

The gas company, organized in 1857, has now about 18 miles of mains. An electric light company divides the business of lighting the streets and business buildings. There are about 10 miles of permanent deep sewers, constructed at an expense of $100,000. The city water-works were erected in 1870. Through 15 miles of main pipe pure water from artesian wells about 200 feet deep is supplied by means of the "Holly System." The capacity of the pumps is 4,000,000 gallons per diem. Near the city are the grounds of the Agricultural Society, consisting of 40 acres, and generally open to the public.

The public city-library contains 5000 volumes.

The public property, exclusive of schools, parks, cemeteries, streets and street improvements, and bridges, is worth $400,000. The city bonded debt is $209,600, and there is no other city or county debt. Jackson was settled in 1830, made the county-seat in 1831, incorporated as a village in 1843, and as a city in 1857. Its American population is chiefly from New York State, and those of foreign birth from the British Isles and Germany.

Within the city limits, and in the immediate vicinity, are several mines of bituminous coal and fire-clay, and quarries of sandstone, which are successfully worked. For Jackson county the U. S. census estimate of the value of the farm products for 1879 was $3,564,796. The population of the county in 1884 was 45,359.

JACKSON, the capital of Mississippi, and of Hinds county, is on the right bank of Pearl River, in lat. 32° 18′ N., long. 90° 6′ W. It is pleasantly situated on elevated and undulating ground, and the streets are regularly laid out and generally well shaded with trees. The town is well built, many of the houses standing in enclosed gardens. The principal public buildings are the State-house (with the valuable State library), the State institutions for deaf-mutes, for the blind, and for lunatics, and the penitentiary. The city is well supplied with churches, schools, banks, and newspapers. The Illinois Central Railroad gives it north and south connections, and is here crossed by the Vicksburg and Meridian Railroad. Another railway extends S. W. 100 miles to Natchez, and a branch line runs N. N. W. to Yazoo City. The region about Jackson is very fertile in cotton and maize. During Gen. Grant's Vicksburg campaign he captured Jackson and destroyed part of the city. It has since been substantially rebuilt. Its population in 1870 was 4234; in 1880, 5204.

JACKSON, a city of Tennessee, seat of justice of Madison county, is on the South Fork of the Forked Deer River, 70 miles E. N. E. of Memphis, and 107 miles by rail S. of Cairo, Ill., with which it is connected by two lines of railway, the Illinois Central and the Mobile and Ohio, which here cross each other, the one running S. from this point to New Orleans, the other S. E. to Mobile. Jackson stands in a fertile and well-wooded region in one of the best developed parts of West Tennessee, and is prominent as a cotton market. The town has saw- and planing-mills, flour-mills, railway-car shops, wagon-factories, a court-house, several churches, an opera-house, 3 weekly newspapers, a national bank, and numerous schools. It is the seat of the South-western Baptist University, founded in 1874, and having a corps of nine professors and instructors. The population in 1870 was 4119; in 1880, 5377.

JACKSON, Charles (1775–1855), an American jurist, was born at Newburyport, Mass., May 31, 1775, being a son of Jonathan Jackson (1743–1810), a merchant of that town, who took a prominent part in State affairs before and after the Revolution. Charles graduated at Harvard College in 1793, studied law with Chief-Justice Parsons, and was admitted to the bar in Essex county in 1796. Removing to Boston in 1803, he attained the highest rank at the bar. He was judge of the Massachusetts Supreme Court from 1813 to 1824, and member of the State Constitutional Convention in 1820. He aided in procuring legal reforms, especially in regard to debtors and creditors. In 1833 he was one of the commissioners appointed to codify the State laws. He died at Boston, Dec. 13, 1855. He published *Pleadings and Practice in Real Actions* (1828).

JACKSON, Charles Thomas (1805–1880), an American chemist, was born at Plymouth, Mass., June 21, 1805, being descended from Abraham Jackson, one of the first settlers. In his youth he made an excursion through New York and New Jersey on foot in company with some naturalists. He studied medicine, taking his degree at Harvard College in 1829. In 1827 and 1829 he made a geological survey of Nova Scotia, an account of which he published. Three years were spent in medical and scientific studies in Europe, diversified by a pedestrian tour on the continent. In 1836 Dr. Jackson was appointed State geologist of Maine; in 1839 of Rhode Island, and in 1840 of New Hampshire. Next exploring the southern shore of Lake Superior he made known its mineral wealth, and in 1847 he was appointed by Congress to survey that region. He made numerous scientific discoveries, and in particular laid claim to the discovery of anæsthetics and to the invention of the magnetic telegraph, disputing the former with Dr. W. T. G. Morton, of Boston, and the latter with Prof. S. F. B. Morse. He published chemical researches on many American plants and *Manual of Etherization, with a History of its Discovery* (1861). He died Aug. 29, 1880.

JACKSON, Helen Hunt (1831–1885), an American author, best known by her initials H. H., was born at Amherst, Mass., Oct. 18, 1831, being the daughter of Prof. Nathan W. Fiske, professor of classics in Amherst College. After receiving a good education, partly under Rev. J. S. C. Abbott, the historian, she was married to Capt. Edward B. Hunt, an engineer officer in the U. S. army. Their children died very young, and in 1863 her husband was killed near Newport, R. I., by the discharge of suffocating vapor from a submarine battery of his own invention. Mrs. Hunt, after recovering from the prostration caused by her loss, found refuge in literary work, at first poems, and then *Bits of Talk about Home.* These, as published in the newspapers, had attracted attention, and when collected in book form caused a demand for more. Meantime two novels were written and published anonymously, *Mercy Philbrick's Choice* and *Hetty's Strange History.* Some other stories have been attributed to her on doubtful authority. Suffering from an affection of the throat, Mrs. Hunt sought relief in the climate of Colorado, and there, in 1876, was married to Mr. W. S. Jackson, of Colorado Springs. Her wanderings in the Territories furnished material for her charming *Bits of Travel.* They also brought her in contact with the Indians, in whose condition and history she became deeply interested. Their wrongs stirred her soul, and henceforth she devoted all her talent to making known to the people of the United States the truth concerning these wards of the nation. She spent the winter of 1880 at the Astor Library in New York in studying from the records their treatment, and published the result under the startling title, *A Century of Dishonor.* As one result of this book, she was appointed by the government on a commission to examine and report on the condition and needs of the Mission Indians of California. During the next winter she published *Ramona*, a novel, in which she treated of the theme which now occupied all her force. An accident at her home in Colorado drew heavily upon her strength, and having gone to California on her work for the government she was overcome by fever. She died at San Francisco, Aug. 12, 1885.

JACKSON, James (1757–1806), an American soldier and statesman, was born in Devonshire, England, Sept. 21, 1757. He emigrated in 1772 to Savannah, Ga., studied law, and in the Revolutionary war commanded a company in Gen. Howe's expedition to Florida, and in the defence of Savannah in 1778. In March, 1780, he fought a duel with Lieut.-Gov. Wells, killing the latter and being himself severely wounded. In 1781 he fought at Cowpens, being brigade-major to Gen. Pickens. He was at the siege of Augusta, Ga., and after its capture was left in command of the garrison. For his services the State legislature gave him a house and lot in Savannah. He was made brigadier-general in 1786, and in 1788 was elected governor but declined. He was member of Congress 1789–91, and was chosen U. S. Senator in 1793. He resigned his position in 1795 and returned to Georgia to denounce the bill by which the legislature had made the Yazoo land-grant. At the next election the opponents of the bill triumphed, and the act was repealed and burnt. Jackson assisted in framing the constitution of Georgia in 1798, and was the first governor under it. At the close of his term he was again elected to the U. S. Senate. He died at Washington, March 19, 1806.

JACKSON, John Adams, an American sculptor, was born at Bath, Maine, in 1825. At an early age he began the study of art in Boston and afterwards went to Paris. In 1851 he executed a bust of Daniel Webster and afterwards modelled busts of many prominent Americans. In 1858 he visited New York, but in 1860 he settled in Florence, Italy. One of his most noted works is Eve and the Dead Abel, which has been highly praised by all critics. Its anatomical truth is the subject of an essay by Dr. Arrowsmith. Among other works by Jackson are Cupid on a Swan, The Culprit Fay, Musidora, The Soldiers' Monument at Lynn, Mass., Hylas. He has also executed many portrait busts and medallions.

JACKSONVILLE, a city of Florida, county-seat of Duval county, stands on the W. bank of the noble St. John's River, 23 miles from its mouth, and in 30° 19′ 38″ N. lat., 81° 30′ W. long. The river and its navigable tributaries make the city the centre of a large and thriving steamboat traffic. Its railway facilities have latterly received very great extension. The railways which centre here are the Florida Central and Western (to Tallahassee and Pensacola); the Fernandina and Jacksonville; the Jacksonville, Tampa, and Key West; the Jacksonville and St. Augustine; and a branch of the Savannah, Florida, and Western. The town is also the objective point of lines of sea-going steamships, and has a large coastwise trade. The streets are wide and well shaded, and cross each other at right angles. The city has churches of all the leading denominations, and is well supplied with banks, schools, and newspapers, and especially with hotels, which furnish accommodations for thousands of invalids and winter tourists. Jacksonville is the principal business centre in the State, and although it was in 1880 surpassed in population by Key West its recent rapid development has given it the first place in this respect. Its export trade is chiefly in lumber, moss, oranges, early market-garden products, and the cotton staples of the State. The town was founded in 1822. Its population in 1870 was 6712; in 1880, 7650; since which time it has been very greatly increased.

JACKSONVILLE, a city of Illinois, county-seat of Morgan county, stands, near Mauvaise Terre Creek, in a rich and beautiful prairie region, 90 miles N. of St. Louis. It is an important railway centre. Here a division of the Chicago and Alton Railroad is crossed by the main line of the Wabash system. These roads here connect with the Peoria, Pekin, and Jacksonville Railroad and with the Jacksonville South-eastern Railway. The town is handsomely laid out, with wide, straight, and well-shaded streets, and many of the houses stand in well-kept gardens. Jacksonville is a noted educational centre. Illinois College is under Congregational auspices, and was founded in 1830; Illinois Conference Female College, a Methodist institution, was founded in 1847; other educational institutions are a high-school, the Whipple Academy, Illinois Female Academy, and the Athenæum and Conservatory of Music. Here also are located a State insane hospital, State asylums for the blind and for deaf-mutes, and an institution for the idiotic and feeble-minded. The city has numerous fine churches, a public library, several large hotels, a number of daily and weekly newspapers, 2 national and 3 other banks. The public-school system is very complete and well sustained. Jacksonville has large commercial and manufacturing interests. Among the leading articles here manufactured are machinery, woollens, flour, lumber, boilers, confectionery, paper, and furnishing-goods. The town is gas-lighted, and has public water-works. The population in 1870 was 9203; in 1880, 10,927.

JACOBI, ABRAHAM, an American physician, was born at Hartum, Prussia, May 6, 1830. He studied at the Universities of Greifswald, Göttingen, and Bonn, graduating at the latter in 1851. Having taken part in communistic movements, he was imprisoned at Berlin and Cologne. In 1853 when set free he went to England and thence to New York. Here he practised his profession and gained special reputation as a writer on obstetrics and diseases of women and children. He was professor of these branches in the New York Medical College from 1861 to 1869, and has since held a similar position at the College of Physicians and Surgeons. He has published a *Treatise on Diphtheria* (1880).

His wife, MARY PUTNAM JACOBI, was born at London, England, in August, 1842, her father being George P. Putnam, the well-known publisher. She was educated in New York, studied medicine in the Woman's Medical College at Philadelphia, and was the first woman who graduated at the College of Pharmacy in New York. In 1868 she went to Paris, being the first woman admitted to its medical school, and graduated in 1871, obtaining the second prize. Returning to New York, she began practice and was made professor of materia medica in the Woman's Medical College. She has published several medical works.

JAHN, FRIEDRICH LUDWIG (1778–1852), a German patriot, known as *Turnvater Jahn*, was born Aug. 11, 1778, at Lanz, Prussia, where his father was pastor. He studied theology and philology at Halle, Göttingen, and Greifswald, and then through the commotions of the time he was drawn away from his peaceful studies. In 1806 he entered the Prussian army, just after the battle of Jena. In 1809, going to Berlin, he became a teacher in a gymnasium, and published his *Deutsches Volksthum* (1810), designed to revive among the Germans the spirit of the times of Hermann. As a further means to this end he established a system of gymnastics, intended to develop a physical perfection supposed to belong to the same times. This *Turn-art* proved immensely popular, and in its training-schools the young men were prepared for the great uprising of the people in 1813. King Friedrich Wilhelm invited Jahn to Breslau, and placed him in command of a volunteer corps. Jahn took part in the subsequent campaigns, and entered Paris in 1815. Returning to Berlin, he resumed his discourses on German nationality, published *Die Deutsche Turnkunst* (1816), and was appointed as instructor of the Turn-gymnasia. But when Jahn resisted the reactionary policy of the government, and the gymnasia were found to become nurseries of liberal thought, the system was prohibited, and Jahn, who had just been called to a professorship of history at Greifswald, was arrested, July 14, 1819. After more than five years' imprisonment at Spandau, Küstrin, and Colberg, he was liberated, but was forbidden to reside in any university town or within 10 miles of Berlin. At Freiburg he still gave trouble to the government by his influence on the young. He had, in 1815, published *Runenblätter*, and in 1828 he issued *Neue Runenblätter.* He was invited to become professor of German literature at Cambridge, Mass., but declined. In 1848 he was elected to the Frankfort National Assembly, but took no prominent part. His work had been done elsewhere, and it had already permeated every part of the German race. He died at Freiburg, Oct. 15, 1852. In 1859 a bronze bust by Schilling was placed on his grave, and in 1872 a memorial bronze statue by Enke was erected on the Hasenheide, near Berlin. His life has been written by Pröhle (1855); Angerstein (1861); Diesterweg (1864); Rothenburg (1871); Euter (1881).

JAMES, HENRY, an American theologian, was born at Albany, N. Y., June 3, 1811. On account of an accident in boyhood he suffered the amputation of a leg. He was educated at Union College, Schenectady, N. Y., and studied for some time in Princeton Theological Seminary, but did not enter the ministry. During a tour in Europe he became interested in the views of Robert Sandeman, and he afterwards published *Remarks on the Apostolic Gospel* (1840), in which he maintained the divinity of Christ, but denied the doctrine of the Trinity. In 1843, while on a second visit to Europe, he became acquainted with the works of Swedenborg, which afterwards greatly influenced his thoughts and writings. He published *A Letter to a Swedenborgian* (1847), in which he argued against the ecclesiastical organization of the New Jerusalem Church. His other publications are *Moralism and Christianity* (1852); *Lectures and Miscellanies* (1852); *The Church of Christ not an Ecclesiasticism* (1854); *The Nature of Evil* (1855); *Christianity the Logic of Creation* (1857); *Substance and Shadow* (1863); *The Secret of Swedenborg* (1869); *Society the Redeemed Form of Man.* His teachings are imbued with a deep love of humanity and with a profound belief in the absoluteness of the Divine Being and the divine humanity of Christ.

JAMES, HENRY, JR., an American author, son of the preceding, was born at New York, April 15, 1843. He was educated partly there and partly in Europe, where he has lived for many years. He has been a frequent contributor of stories, sketches, and criticisms to the leading periodicals. His books comprise *Passionate Pilgrim and other Tales*, *Transatlantic Sketches*, *Roderick Hudson* (1875); *The American* (1876); *Watch and Ward*, *The Europeans* (1879); *Confidence*, *The Portrait of a Lady* (1881); *Daisy Miller*, *Washington Square*, *Portraits of Places* (1883). James is the foremost of the American analytic school of romance writers. Though the scenes of his stories are often laid in Europe, he is thoroughly American in thought and style, and excels in the portrayal of marked American character.

JAMESON, JOHN ALEXANDER, an American jurist, was born at Irasburg, Vt., Jan. 25, 1824. He graduated at the University of Vermont in 1846, and was tutor there from 1850 to 1853. Having studied law, he removed to Illinois and began practice at Freeport, but removed to Chicago in 1856. He was made judge of the Superior Court of Chicago in 1865. He was made professor of constitutional law, equity, and jurisprudence in the law-school of the University of Chicago in 1867. He has published *The Constitutional Convention* (1866); *Law of Judicial Sales* (1871).

JAMESTOWN, an incorporated village of New York, in Chautauqua county, is at the outlet of Chautauqua Lake, 70 miles from Buffalo. It is on the New York, Pennsylvania, and Ohio Railroad, and also on the Buffalo and South-western and the Dunkirk, Allegheny Valley, and Pittsburg. It has several hotels, 3 national banks, 5 weekly and 2 daily newspapers, 10 churches, and 10 schools. It is largely engaged in manufactures, producing woollen and alpaca goods, chairs, tables, pianos, furniture, agricultural implements, etc. There are 4 foundries and machine-shops, several saw- and grist-mills. The first settlement was by James Prendergast in 1810, the town being laid out in 1815, in which year cotton manufacture was commenced. It was incorporated in 1827. It has gas-works, though natural gas is used for fuel. The valuation of its property is $2,500,000. Population in 1880 was 9357. The Chautauqua assembly, founded in 1874, with its numerous outgrowths, has made this vicinity a favorite summer resort. (See CHAUTAUQUA.)

JANES, EDMUND STORER (1807–1876), an American bishop, was born at Sheffield, Mass., April 27, 1807. When he was four years old his parents removed to Salisbury, Conn. After receiving a common-school education he taught school and studied law, but in 1830 he resolved to enter the ministry. He was admitted to the Philadelphia Conference of the Methodist Episcopal Church and while engaged as pastor in

Philadelphia and New York also studied medicine. In May, 1840, he was appointed financial secretary of the American Bible Society, and found this an excellent field for his eloquence, energy, and wisdom. In 1844 he was chosen bishop, which office he held for thirty-two years. During this time he was faithful and indefatigable in the discharge of his duties at home and abroad. In 1864 he was delegate to the British Wesleyan Conference, and he had supervision of the missions to Northern and Central Europe from 1864 to 1868. He was also in 1865 the delegate from the American Bible Society to the British and Foreign Bible Society. His residence was chiefly at New York city, and there he died, Sept. 18, 1876. His *Life* was published by H. B. Ridgeway (1882).

JANESVILLE, a city of Wisconsin, seat of justice of Rock county, is 71 miles W. S. W. of Milwaukee and 91 miles N. W. of Chicago. It is traversed by the Rock River, which is here crossed by dams and affords a valuable and well-utilized motive power. The town mostly stands in the narrow intervale or bottom-land near the river, with bluffs on either side. It has 3 bridges across Rock River besides 3 railroad bridges. Janesville has a fine court-house, 10 churches, 2 national banks, 9 hotels, an opera-house, and a State institution for the blind. Of industrial establishments there are 2 cotton-mills, 2 woollen-mills, 7 flouring-mills, 2 foundries and 34 factories, manufacturing agricultural implements, carriages, boots and shoes, furniture, soap, pickles, and cigars. Three daily and 5 weekly papers are published here. The place was settled in 1836, and the city takes its name from the first settler, H. F. Janes. It was incorporated in 1853, and its property is now valued at $4,057,240, the public debt being only $8500. The city is handsome, the buildings being chiefly of brick, and is lighted with gas. Janesville is on the Chicago and Northwestern Railroad, at the junction of the Afton branch, and also at the junction of two branch lines of the Chicago, Milwaukee, and St. Paul system. Its population in 1870 was 8789; in 1880, 9018.

JANET, Paul, a French philosopher, was born at Paris, April 30, 1823. He was educated at the Normal School and in 1845 became a teacher in the gymnasium at Bourges. In 1848 he was made professor of philosophy at the University of Strasburg. In 1857 he returned to Paris as professor of logic in the College of Louis le Grand, and in 1864 he was made professor in the Sorbonne. He is one of the most profound and spiritual philosophers of France, maintaining with acknowledged ability the orthodox Christian philosophy in opposition to the prevailing materialism and atheism. Janet has been a member of the Academy of Moral and Political Sciences since 1864. His works comprise *La famille* (1855); *Histoire de la philosophie morale et politique* (1858); *La philosophie du bonheur* (1862); *Le materialisme contemporain en Allemagne* (1864); *Le cerveau et la pensée* (1866); *Les problèmes du XIX me Siècle* (1872); *Philosophie de la Révolution française* (1875); *Les causes finales* (1876); *La philosophie française contemporaine* (1879); *Les origines du socialisme contemporain* (1883). He has also translated into French the *Confessions* of St. Augustine.

JANNEY, Samuel M. (1801–1880), an American preacher and author, was born in Loudon co., Va., Jan. 11, 1801. He belonged to the Society of Friends and his writings relate to the history and teachings of that religious body. They include *Conversations on Religious Subjects* (1835); *Teacher's Gift*, partly in verse (1840); *Historical Sketch of the Christian Church during the Middle Ages* (1847); *Life of William Penn* (1852); *Life of George Fox* (1855); *History of the Religious Society of Friends* (4 vols., 1867). In the last work he treats of the causes of the division of the Society in 1828, and though adhering to the Hicksite branch is acknowledged by both parties to have shown great moderation, scrupulous regard for facts, and a kindly spirit. In 1869 he was appointed by Pres. Grant superintendent of Indian affairs in the North West. He died April 30, 1880.

JANS, Anneke (1600–1663), was born in Holland about 1600, and came to America with her husband, Roelof Jansen, who had been sent by Patroon Van Rensselaer to be assistant steward of his estate at Albany. Jansen however settled in New Amsterdam (now New York), and in 1636 obtained from Gov. Wouter Van Twiller a grant of 62 acres lying between Broadway and the North River. Jansen having died, his widow married in 1637 Everardus Bogardus, the first Reformed Dutch clergyman of the settlement. In 1647 Bogardus sailed for Holland but was lost by shipwreck on the coast of Wales. Anneke Jans, as the widow was called, obtained in 1654 from Gov. Peter Stuyvesant a patent of the farm then called the Dominie's Bowery in her own name, and this grant was confirmed by the English government on Aug. 27, 1664. Meantime she had died at Beverwyck, N. Y., March 19, 1663, leaving the estate to her eight children, four by each marriage. In 1671 five of the heirs conveyed the farm to Gov. Francis Lovelace, as representative of the proprietary, the Duke of York. In 1705 the estate, then known as the King's Farm, was granted by the colonial authorities to Trinity Church, and for the most part it still remains in possession of that corporation. Several attempts have been made by persons claiming to be descendants of Anneke Jans to recover part of the property, but the courts have held that the church has gained a valid title by undisputed possession for sufficient length of time.

JANSON, Kristoffer Nagel, a Norwegian poet, was born at Bergen, May 5, 1841. He became a teacher at Bonheim and in 1876 received from the parliament a literary pension. In 1882 he resigned his pension, removed to America and settled at Minneapolis as a Unitarian preacher. The best of his poems and tales are written in the people's dialect. Among his writings are *Fraa Bygdom* (1866); *Norske Digt* (1867); *Han og ho* (1868); *Marit Skjölte* (1868); *Torgrim* (1872); *Den Bergtekne* (1876); the epic *Sigurd Bresteson* (1872); and the dramas *Jon Arason* (1867) and *Austanfyri Sol og vestanfyri Maane* (1879). His tale, *The Spell-bound Fiddler*, has been translated into English.

See Vol. XIII. p. 578 Am. ed. (p. 569 Edin. ed.).

JAPAN. Marco Polo on hearing the name of Nippon pronounced by the Chinese Ju-pon or Zi-pon (day-beginning or sun-rise), with the added word *ko* or *ku* (country), wrote of Zi-pan-gu. The Portuguese and southern Europeans made this Japon, and the northerners or Teutonic people Japan. The name was given evidently by the conquering invaders near the beginning of the Christian era, who came from the west or Asian mainland. Corea is but 15 hours by steam from Kiushiu, Tsushima being midway. The native equivalent for the Chinese word, pronounced in Japan Ni-hon or Nip-pon, is *hi no moto*, or "beginning of day." Japan is the country where the day begins. The neighbors of Japan are now Russia, Corea, and China; with France in Annam and the United States in Alaska not far away. Of the 146,572 square miles of territory, Hon-do (the main island), Kiushiu, Shikoku, Sado, Tsushima, Awaji, Oki, Iki, and the smaller islands neighboring on the preceding may be called Old Japan, as that part of the empire settled from ancient times, and included under the original classic title of Oyashima (the Eight great islands). New Japan comprises Yezo, Chijima (Kuriles), Riukiu (Loo Choo), and Ogasawara (Bonin) Islands, which were once colonies, were settled in recent times, and until the present decade occupied a different political position. In Old Japan are reckoned 109,735 square miles, or 74.9 per cent. of the total area, and 33,312,126 persons; the corresponding figures for New Japan being 36,836 square miles and 311,211 inhabitants. By census of 1883 the population of the empire was 37,442,966, or 18,950,159 males and 18,492,807 females. Of this number about 2,000,000 may be reckoned among the nobility and gentry; the farmers, mechanics, merchants, and other producers number about 22,000,000, and there are 12,000,000 under 14 years of age; the blind, maimed, idiotic, imprisoned, disabled, etc., comprising the remainder. The capital since 1868 is Tokio, formerly called Yedo, with a population of 1,191,161. The seaport Yokohama has 80,000, and the prefecture of Kanagawa 855,333 souls. There are about 5000 white foreigners and at least an equal number of Chinese at the treaty ports. Yokohama is the commercial centre of the empire, and the focus of the steamship, railway, and telegraph lines. The Japanese introduced the telegraph in 1869. They are now connected by two submarine cables with Europe and America and by one line to Corea. Native inventors have taken medals at congresses or exhibitions of electrical science. The telephone is in use in the large cities, and the electric light in several of them. Telegraphs, with 13,972 miles of wire, ramify over the empire. During the year 1885, 350 miles of new line were constructed, the total length of line being 5056 miles; 48 miles of cable, containing 108 miles of wire, are in use. The above figures represent the plant owned by the Japanese government, the three cables from Nagasaki to Siberia, Hong-Kong, and Fusan being owned by foreigners. Of 243,842 messages received or sent from the Yokohama office in 1885 there were 206,136 Japanese, 17,573 foreign, and 20,133 international. There are 199 telegraph offices open to the public and 42 for government business alone. The inception of the railway system was coincident with the restoration of the Mikado and his ancient supreme power. The first proposition was to construct a railway from Kioto to Tokio through the heart of the country. Lack of capital and the strenuous opposition of the conservative elements, which looked with suspicion upon ideas imported from Christendom, hindered the carrying out of this scheme. A railroad from Yokohama to Tokio, 18 miles long, was constructed, and opened with great ceremony in 1872, a loan of $5,000,000 having been secured in England to build it. In 1873, 1,223,071 and in 1884, 2,172,105 persons were carried on this line, which shows the great popularity of this method of travel. All the wood-work and the lighter metal portions of the rolling stock are now made in Japan, and the trains, engines, and offices are worked by natives. This is the only double line in the empire, the others being single tracked, and all 3 feet 6 inches in gauge. Sixteen Englishmen comprise the foreign staff. Other lines connect Kobe, Osaka, and Kioto, 59 miles; Kioto and Otsu, 11¼ miles; Tsuruga and Ogaki, 49 miles; Tokio and Mayebashi, 68¼ miles; Shinagawa and Kawaguchi, 13 miles. The average rate of speed is 18 miles. Other lines in course of construction are Tokio to Kioto, along the old Nakasendo (middle mountain road), 213 miles, and another along the old Oshiukaido (northern sea road) from Tokio to Awomori, 398 miles. Several smaller road-beds are surveyed and staked out. In the summer of 1885 there were 265 miles of railroad open, 271 in course of construction, and 543 in contemplation. All of these roads are of English construction and equipment, though educated natives are now doing most of the survey engineering and constructive work, while the mechanical labor is almost wholly Japanese, one large company employing no foreigners. The railroad from Sapporo to Poronai in Yezo is 56½ miles long and 3 feet gauge. It was constructed at much less cost than those on the English plan, and the equipment and rolling stock are American. Serious obstacles to internal transportation are presented by the continuous chain of mountains, which traverses the whole length of the main island from north to south. An unusually large number of bridges and tunnels must be provided for in building any road from east to west. The configuration of the islands renders ocean transportation cheap and easy, no place of importance being over 100 miles from the sea. The coasting trade between the treaty ports, formerly in the hands of Americans, has, since 1874, been carried on by native steamship companies. The Kiyodo Unyu (United Shipping) and Mitsu Bishi (Three Diamonds) corporations, employing a large fleet of steamers and sailing vessels, purchased from the Pacific Mail Company or built to order in England, held property in all the ports of Japan, including Riu Kiu and the Bonin Islands, in Corea, and in Shanghai, China. Between these two companies a war of rates and insane rivalry was kept up during the greater part of the year 1885, until October. Then, wiser and much poorer, after loss of money, the two companies were consolidated under the title Nippon Yusen Kaisha, the Japan Mail Shipping Company. With such facilities of transport by land and sea the postal system has developed prodigiously. Instead of the occasional naked foot-runner with a package tied in a split bamboo of old time, all classes enjoy the mail train steamers and uniformed army of carriers in every city, with street letter-boxes and splendidly equipped post-offices. According to the postmaster-general's report for 1884 over 90,000,000 covers were handled through the mails. Japan belongs to the postal union, and in 1885 concluded a money-order convention with the United States.

Medicine.—In medical science and practice the Japanese are the most advanced of Asiatics. Five distinct periods of history in this branch of knowledge are recognized: 1. Until about B. C. 200, pure Japanese medicine; 2. Introduction of Chinese and Corean medicine, B. C. 200 to A. D. 700; 3. Growth and decay of the Chinese system, 8th to 16th century; 4. Introduction of European and revival of the Chinese school, from about A. D. 1550 to 1868; 5. The establishment of hospitals and colleges on the western plan. Passing over the labors of the Portuguese and Spanish physicians of the 17th century, it may be stated that the Dutch Doctor von Siebold at Nagasaki, in 1824, was the founder of modern medical practice in Japan. In 1849 Dr. Mohnike introduced the art of vaccination, which is now compulsory by law throughout the empire. In 1857 Pompe van Meerdervoort established at Nagasaki a medical school and later a hospital; two of the native pupils being sent to Holland for education. Medical work was continued by Dutch and American physicians, notable among whom is the veteran lexicographer and philanthropist J. C. Hepburn, M. D., of New York. In 1858 the germ of the medical department of the University of Tokio began. This institution has now 1061 students, with five German professors of eminent ability. It awards the degree of master of medicine; the preparatory course occupies three years, and the main course in German of four years. There are also special courses in medicine in the vernacular and in pharmacy. There are 31 medical schools and 350 hospitals, supported by the prefectures, and 294 self-supporting, which are thus classified: general, 487; venereal, 130; insanity, 2; lepra, 5; ophthalmic, 9. There are also 8 army and navy and 9 missionary hospitals; 18 medical societies, educational or charitable, and 2 hygienic societies, one with 20 branches and 5620 members, diffuse information by means of libraries, museums, dispensaries, and meetings; and number of creditable journals, of from 30 to 60 pages each, which are printed in Japanese and English, and in some cases illustrated. A company of native and foreign scholars are compiling a national pharmacopæia based upon modern medicine, to be published in Japanese and Latin. As surgeons, oculists, and dentists, the Japanese practitioners excel.

While the Chinese practice is still in vogue among the ultra-conservative upper and the lower ignorant classes, the newer methods are increasingly followed, so that even those of the professedly Chinese school are usually eclectic in their methods. The best native physicians now earn on the average $1200 per annum.

Education and Language.—By a notification of the educational department, issued Nov. 29, 1884, the study of the English language was made part of the curriculum of the common schools. The possibility of English becoming the speech of the educated rests upon the power of the higher schools to turn out competent teachers with sufficient rapidity. There are now, in addition to private educational institutions, 2 universities, 173 colleges, 78 normal, 1212 special professional or technical, 6 higher female, and 29,081 common schools. The number of pupils in attendance daily is 3,090,918. It is highly probable that the ancient systems of Chinese ideographic and native syllabic writing will not be in general use two generations from the present. The use of the Roman letter for the expression of thought in Japanese has received a mighty impulse through the formation of the Romaji Kai (Roman Alphabet Association) in Tokio, with branches elsewhere. This company, composed of natives and foreigners, has reduced all possible sounds and vocal combinations to a uniform method of expression by means of 22 Roman letters, *l*, *x*, *q*, and *c* being rejected. They now print a newspaper in Roman letters, and will issue text-books, besides transliterating the standard literature. It is proved that a native who knows the spoken language can learn to read in one-tenth the time formerly required for the mastery of the colloquial and book language. The system adopted is substantially that employed by Dr. Hepburn in his editions of the Japanese-English dictionary, long since accepted as the standard. The progress of popular education, the use of English language, and the Roman letter have been greatly aided by the large and earnest corps of missionaries in the country, most of whom are American. Beginning operations in 1859, they labored until 1872 before a Christian church of 10 believers was gathered. The native Christians of the Roman form of Christianity now number over 25,000, of the Greek Church 15,000, of the Reformed or Protestant Churches 8000. Despite the outward differences on minor questions of faith and practice, the powerful influence of Christian sentiment is mightily leavening society and government.

American Intercourse.—The American flag was first carried round the world by Major Robert Shaw, of the U. S. First artillery, and was seen at Nagasaki in 1797. Again in 1803, during the wars of Napoleon, Captain Stewart, an American, used his flag to cover English goods and open trade with Japan. In 1807, in the Eclipse from Boston, a like attempt was made. The annual Dutch vessels coming to Nagasaki in 1799, 1800, 1801, 1802, 1803, and one of the two ships in 1806, 1807, 1809, bore the flag of seventeen stars and thirteen stripes of the United States of America for protection. In 1832 Pres. Jackson sent Capt. Edmund Roberts in the U. S. steamer Peacock to Siam and Japan. Roberts died at Canton, but the Peacock visited the Bonin islands. By favorable treaties made with Russia the Asiatic waters of that power were from 1832 alive with American whaling ships, eighty-five of which passed Matsumae in Yezo in one year. To return the Japanese waifs blown out to sea, and carried by the Kuro Shiwo, or Dark current, to the shores of America, and to obtain and bring away the American sailors shipwrecked in Japan, became an increasingly frequent necessity. In 1837 the American brig Morrison entered Yedo Bay for this purpose, but was driven off by cannon shot. In 1845 Gen. Zadoc Pratt in Congress offered a bill proposing commercial arrangements with Japan and Corea. In April, 1845, Capt. Mercator Cooper, of Sag Harbor, returned 22 waifs to their native soil, remaining 4 days in the Bay of Yedo. Commodore Biddle, in July, 1846, with the U. S. steamers Columbus and Vincennes, applied to the authorities of Yedo for trade and a treaty, but was refused. For the reclamation of the 23 American sailors then in prison, Commander Glynn in the brig Preble was sent to Nagasaki in 1848. His stalwart policy was successful, and he proposed that a special mission be sent. This was put under command of Commodore Aulick, who was recalled before his fleet was gathered; and Commodore Matthew Calbraith Perry given charge, with the promise of an imposing squadron. On the 14th of July, 1853, at Uraga, Perry delivered the President's letters to agents of the Sho-gun, and gave notice of his return the following year. With a fleet of 12 vessels he appeared again, Feb. 12, 1854, and made a treaty signed March 23, at Yokohama, on the site now partly occupied by the Union Church and the U. S. consulate. Townsend Harris, the energetic successor of Perry, negotiated a further treaty of trade, commerce, and residence for foreigners, and secured a promise of the opening of more ports. Little or nothing has as yet been obtained in diplomacy from Japan beyond that accomplished by American diplomatists, to whom is due the honor of opening this once secluded nation to cosmopolitan relations. Nineteen nations have since made treaties with her.

Internal Changes.—It soon became evident to the foreigners resident at the ports that great political commotions were taking place and that the tenure of power of the signatory of the treaties, the so-called tycoon, was by no means sure. In 1868 civil war broke out, lasting two years. After the smoke cleared away the national capital was found to be in Tokio (formerly Yedo) and the mikado sole ruler. Soon the feudal system was swept away, and a policy of centralization with the adoption of western ideas was then begun that has made Japan the most progressive of Asiatic nations. Contrary to the prevalent idea abroad that all this was the result of contact with foreign civilization, it seems certain that the country was ripe for political revolution before Perry came, and that the presence and influence of foreigners only served to precipitate the crisis. The study of the ancient national literature, the revival of Confucian and primitive Chinese ethics, the renascence of Shinto, the indigenous cult, and the study of the Dutch language by leading scholars, were all elements which flowed together, making a flood that destroyed the dual system and swept away the tycoon and his establishment. In this uprising of a nation all the wild forces and passions let loose in revolution were far from spent when the ancient form of government had been floated into power. Providentially it was ordered just at that crisis that the two tides—from within and from without—should meet. The resultant of the clashing forces was acceleration in a new direction—the adoption of western civilization. The radical change in habits, ideas, and policy astonished the Japanese themselves nearly as much as this procedure of an Asiatic nation surprised Christendom.

The part played by the United States in this renovation of Japan has ever been a leading, unselfish, and honorable one. By her diplomatists, teachers, missionaries, scientific men on the soil, by her hospitality to the Japanese students among us, and by her repayment in 1884 of the unfairly levied Shimonoseki indemnity of 1864, amounting to $750,000, she has shown her sincere desire to assist a struggling nation. The standard political literature of the United States has been, and is yet, very influential in forming political opinion. The Declaration of Independence, the Constitution, treatises on international law, and important selections have been repeatedly translated. Nearly 2000 native newspapers are published, and these, with debating clubs, political associations, and the presence of hundreds of young men educated in Europe and America, are doing much to educate the people for their coming responsibilities. From inquiries made by the writer at the education department in Tokio, and set forth in detail in his pamphlet, "The Rutgers Graduates in Japan," he has found that from 1865 to 1884 the number of students educated abroad at government expense was 594. Nearly an equal number of young men studied at private charges, while the number of commissioners, specialists, or travellers who came to examine and report upon the civilization of Christendom must be little short of 3000. Only the graduates of the universities in Tokio are now sent abroad to study, and these mostly to Germany. The record of the Japanese students in foreign institutions of learning has been a brilliant one, and on returning home the majority have entered at once upon active duties in government posts or in the practice of their professions. Nearly all of them were of the middle samurai or gentry class.

The tendency in Japanese politics since 1868 has been towards the elimination of the nobility from active administration, and the steady rise into power of the samurai. The composite government created at the restoration in 1868 was founded on the theory of a union of the throne and the people, without any intermediaries except the court nobles. These kuge, or descendants of relatives of mikados, furnished from their number Iwakura and Sanjō, who acted as premiers, while the administrative details were carried out by able men of inferior rank. The latter were generally chosen from the two leading clans, Satsuma and Choshiu, by which the revolution which deposed the tycoon and abolished feudalism had been inaugurated and brought to conclusion. Under pressure of public opinion the mikado, on Oct. 12, 1881, gave promise in a solemn proclamation that in 1890 a national parliament would be called, the imperial prerogative limited, and a representative government be formed. In preparation for this event the emperor's rescript of June 6, 1884, created five orders of nobility, viz., princes, marquises, counts, viscounts, and barons. These, who are expected to furnish the personnel of an Upper House of Lords or Notables, receive rank according to the age and standing of their families, or in recognition of their services to their country. They now number nearly 300. A further change in the government of almost revolutionary import took place Dec. 23, 1885. This, by the recommendation of Sanjō and the decree of the mikado, consisted of the abolition of the triple premiership of court nobles, of the privy council, and of the ministries of departments as then constituted, and the creation of the office of minister-president of state, and a cabinet consisting of the heads of the departments of foreign affairs, home affairs, finance, war, navy, justice, education, agriculture and industry, and communications (railways, telegraphs, mails, etc.). Not a single member of the court aristocracy was appointed to the new offices in the cabinet, but all were filled by men sprung from the ordinary gentry, men of more or less education in foreign languages, literature, and ideas. Count Ito, the president of the cabinet, Count Inouye, minister of foreign affairs, Mr. Mori, minister of education, and Admiral Enomoto, minister of communications, were formerly students in America or Europe. The step taken was in the direction of democracy, improvement, economy, executive uniformity, and national vigor. Possible danger from over-centralization is provided against by the national parliament soon to assemble. The abolition of the loose system of government by composite but heterogeneous elements, under which the country has suffered for 18 years, is an advantage not easily measured in words. Under such auspices progressive Japan begins the 18th year of Meiji (Enlightened Peace), the 2546th "from the foundation of the empire," and the 1886th of the Christian era.

(W. E. G.)

JARVES, James Jackson, an American author and art-critic, was born at Boston, Aug. 20, 1818. On account of weakness of the eyes he gave up his plans of professional life, and visited Brazil and Peru in 1837 and 1838. He then went to the Sandwich Islands, where he was U. S. consul at Honolulu. In 1840 he established the *Polynesian*, the first newspaper printed there, which became the official organ, while Jarves was made director of the government press. In 1848 he returned to the United States, but in 1849 he was appointed by the king as special commissioner to negotiate treaties with the United States, France, and Great Britain. He had already published *A History of the Hawaiian or Sandwich Islands* (1844), and *Scenes and Scenery in the Sandwich Islands* (1844). In 1851 he went to Europe, and his book, *Parisian Sights and French Principles* (1852), attracted enough attention to be reprinted in England, and to be interdicted in France. Jarves went on with his studies and observations, and next issued *Italian Sights and Papal Principles* (1855). His next book, *Art Hints*, subsequently enlarged into *Art Studies*, is chiefly a history of early Italian art, illustrated by outline drawings from the early masters. His *Confessions of an Inquirer* (1857) is a curious philosophical and educational miscellany. As second part of this appeared *The Art Idea* (1864), and in 1866 he continued it, treating of sculpture, painting, and architecture in America. His *Art Thoughts* (1869) gives his matured convictions on the subjects of his life-study. His large collection of paintings, illustrating the different schools, was exhibited at New York, and being unable to dispose of the whole at what he considered a fair price he deposited it in the fine-art gallery of Yale College; many of the pictures have since been sold to private purchasers. Jarves continues to reside at Florence, and is well known in Italy as a connoisseur. His latest work is *Italian Rambles* (1883).

JARVIS, Edward, an American physician, was born at Concord, Mass., Jan. 9, 1803. He graduated at Harvard College in 1826, and received the degree of M. D. from its medical school in 1830. He practised his profession at Northfield and Concord, Mass., at Louisville, Ky., and in 1843 settled at Dorchester, Mass. He gave much attention to the treatment of insanity, and still more to the collection and study of vital statistics. Among important works and documents which he prepared are *Sanitary Survey of the State of Massachusetts* (1848–49); *Report on the Insane and Idiots* (1856); *Report on the Mortality of the Eighth Census* (1865); *Physiology and the Laws of Health* (1865); *Increase of Human Life* (1869); *Relation of Education to Mental Disease* (1872); *Relation of Common Education to Common Labor* (1873); *Provision for the Insane* (1872); *Infant Mortality* (1873); *Political Economy of Health* (1874).

JARVIS, Samuel Farmer (1786–1851), an American clergyman, was born at Middletown, Conn., Jan. 20, 1786, being the son of Bishop Abraham Jarvis (1739–1813), the successor of Bishop Seabury. He graduated at Yale College in 1805, and being ordained in 1810, had charge of a church at Bloomingdale, N. Y., until May, 1819, being also professor of biblical criticism in the General Theological Seminary. He was rector of St. Paul's Church, Boston, from 1820 to 1826, when he went to Europe and spent 10 years there, 6 in Italy. Returning to the United States in 1835 he was made professor of oriental literature in Washington (now Trinity) College, Hartford, Conn., and in 1837 he became rector of Christ Church, Middletown. In 1838 he was appointed by the General Convention historiographer of the American Episcopal Church, and in 1844 he published *Chronological Introduction to the History of the Church.* He died at Middletown, Conn., March 26, 1851. Among his publications were a *Reply to Dr. Milner's End of Controversy* (1847); and *The Church of the Redeemed* (1850).

JASTROW, Marcus Mordecai, a Polish-American rabbi, was born at Rogasen, Posen, Prussia, June 5, 1829. After studying at the gynasium of Posen and the University of Berlin he graduated at Halle in 1856. He became preacher and assistant rabbi at Warsaw in 1858, and in 1861 was imprisoned in the citadel of Warsaw. Being banished in January, 1862, he became rabbi at Mannheim, but was recalled to Warsaw in August, and remained there until 1864, when he went to Worms, Hesse. In 1866 he accepted a call to be rabbi of the German Hebrew congregation Rodef-Shalom, in Philadelphia, where he has since remained. He has published *Kazania*, lectures in the Polish language (1862); *Die Lage der Juden in Polen* (1859); *Vorläufer der Polnischen Revolution* (1864); *Vier Jahrhunderte*, a history of the Jews of the Second Commonwealth (1865), and a valuable *Hebrew-German Lexicon* (1885).

See Vol. XIII. p. 621 Am. ed. (p. 610 Edin. ed.).

JAY. This interesting group of birds is well represented in North America, there being about 12 species known to science, of which the blue jay is among the most characteristic of American birds. This species (*Cyanocitta cristata*) is a bird of graceful form and rich and varied coloring. It is about 1 foot in total length, fully 5 inches of which belong to the tail. In color it displays varied and delicately shaded tints of blue, which are agreeably diversified by bars of jet black and white tips in the wing and tail feathers. A black band surrounds the neck, and is contrasted with the grayish-white hue of the cheeks and under parts. In addition the head bears a handsome crest of feathers. The blue jay is found everywhere from Canada to the most Southern States, and is in some places a nuisance to farmers from its depredations on fruits and seeds. It is omnivorous in diet, and is addicted to robbing birds' nests, sucking the eggs or devouring the young. It is a familiar and garrulous bird, its ordinary cry of *jay, jay, jay*, being varied by many other notes. It has, in fact, something of the imitative power of the mocking-bird. It is said to imitate the cry of the sparrow-hawk so exactly as to send small birds flying hastily to cover. In return it enjoys teasing hawks and owls, sometimes to its own discomfiture. It nests in evergreen trees, laying 4 or 5 greenish-drab eggs, speckled with brown. Of the other species the plain-colored Canada jay of the North, one of the boldest and most familiar of birds, and the Florida jay of the South, are two of the best known. The latter, which is mainly confined to Florida, is of the same general color as the blue jay, but lacks the crest, the black bars, and the white markings of the latter. Steller's jay, a species common on the Pacific coast and the Rocky Mountain region, is a bird of considerable interest. It is much more bold, irritable, and familiar than the common jay, and is very curious and watchful in its habits. It is said to follow strangers, occasionally in silence, but oftener with vociferous scolding. The jays belong to the same family as the crows, and are distinguished by straight, strong, moderately long bills, stout, compact bodies, tail rather long and much rounded, wings rather short, and plumage of blended hues.

JAY, JOHN, an American lawyer and diplomatist, was born at New York, June 23, 1817. He graduated at Columbia College in 1836, and was admitted to the bar in 1839. In that same year he began his public labors in behalf of the anti-slavery cause. As a member of the Episcopal Church he strongly urged its duty to take action in this matter. He also took a prominent part in opposition to the ignoring of the slavery question by the American Tract Society. These labors were varied by his resistance to the Tractarian movement. Several of his published arguments have reference to the cases of fugitive slaves, whom he was ever ready to befriend. On the outbreak of the civil war Mr. Jay was prominent in advocating the anti-slavery character of the contest. He was one of the founders of the Union League of New York, and for some time its president. At the close of the war he was active in urging the duty of the nation to the freedmen. In April, 1869, Pres. Grant appointed Mr. Jay U. S. minister to Austria.

JAY, WILLIAM (1789–1858), an American philanthropist, was born at New York, June 16, 1789, being the second son of Chief-Justice John Jay (1745–1829). (See ENCYCLOPÆDIA BRITANNICA.) He graduated at Yale College in 1807 and studied law, but soon retired to Bedford, N. Y., where he assisted in managing his father's estate. In 1815 he was one of the founders of the American Bible Society, which he defended against the attacks of Bishop Hobart and other members of the Episcopal Church, to which Jay himself belonged. A temperance society, organized in 1815, and various missionary and benevolent movements, gave scope for his philanthropic inclinations. In 1818 he was appointed a judge of the court of common pleas, and in 1820 was made the first judge of Westchester county. In 1835 he published *An Inquiry into the Character of the American Colonization and Anti-Slavery Societies*, and in 1838 *A View of the Action of the Federal Government in Behalf of Slavery*. His pronounced anti-slavery opinions finally, in 1842, caused him to be superseded in the office of county judge. In 1843 he went to Europe and thence to Egypt, where, with Sir George Wilkinson, he investigated the subject of Egyptian slavery. He was for some years president of the American Peace Society, and in 1848 published *War and Peace*, in which he proposed the insertion in treaties of stipulations for the settlement of differences by arbitration. In 1849 Judge Jay published *A Review of the Causes and Consequences of the Mexican War*. His various publications, 43 in number, were widely circulated, and exerted much influence on public opinion. His principal work was *The Life and Writings of John Jay* (2 vols., 1833). He died at Bedford, N. Y., Oct. 14, 1858.

JEAFFRESON, JOHN CORDY, an English author, was born at Framlingham, Suffolk, Jan. 14, 1831. After some study of medicine with his father he went to Pembroke College, Oxford, where he took the degree of B. A. in 1852. He studied law, and was admitted to the bar in 1859. After a very active literary career he was employed in 1874 as one of the inspectors of records in various parts of England. He has published a long series of novels, the first being *Crewe Rise* (1854), and the most notable *Not Dead Yet* (1864), which in some respects anticipated the famous Tichborne case. He has also issued a series of books bearing on the social history of England, among which are *A Book about Doctors* (1860); *A Book about Lawyers* (1866); *A Book about the Clergy* (1870); *Brides and Bridals* (1872); *A Book about the Table* (1874). His *Annals of Oxford* (1871) showed little regard for tradition, and thus provoked much abuse of the author. Mr. Jeaffreson has also prepared a *Life of Robert Stephenson* (1864), and *A Young Squire of the Seventeenth Century* (1878). His books are entertaining and chatty, full of anecdote and curious information.

JEFFERSON, JOSEPH, an American actor, was born at Philadelphia, Feb. 20, 1829. His grandfather, Joseph Jefferson (1776–1832), was an English actor, who emigrated to the United States in 1795. His mother was Mrs. Burke, a noted vocalist. He appeared very early on the stage, and attained distinction in a great variety of comic parts from Bob Acres to Caleb Plummer. He has made professional tours in England and Australia as well as in the United States. In September, 1865, he appeared in a new version of *Rip Van Winkle*, prepared by Dion Boucicault, and has since been identified with that character, having played it almost exclusively for many years.

JEFFERSON CITY, the capital of Missouri, and county-seat of Cole county, is pleasantly situated on the highlands overhanging the Missouri River, 8 miles N. of the mouth of the Osage River, and 125 miles W. of St. Louis. The Missouri Pacific Railway and the Chicago and Alton and South-west Railroad connect the capital with all parts of the State. Among the public buildings are the U. S. court-house and post-office, State-house, Governor's mansion, State Supreme Court-house, State armory, State penitentiary, and Lincoln Institute; the last being a college for the colored race and entirely supported by the State.

Jefferson contains 7 hotels, 1 national and 2 private banks, 4 weekly and 2 daily newspapers. There are 3 flouring-mills. The State prison with its 1500 convicts furnishes the chief manufactures; the city proper has also 2 shoe-factories, 1 broom-, 2 wagon-, and 2 barrel-factories, and 1 foundry, 2 breweries, and 2 machine-shops. The city is well supplied with gas and electric lights. The city property is valued at $1,000,000 to $1,500,000, and the debt is about $50,000. The town was settled in 1820 by Kentuckians and Virginians, was incorporated as a city in 1839, and became the permanent seat of government Oct. 1, 1826, the town site having been granted by the U. S. government conditioned upon its forever remaining the capital of the State of Missouri. In 1844 the city suffered from cholera, introduced by Mormon immigrants. In 1864 the Confederates under Gen. Sterling Price besieged the city, but after a short bombardment, departed. Jefferson City, being surrounded by an amphitheatre of wooded and verdant hills, affords a charming summer residence, and was pronounced by Bayard Taylor to have the loveliest site in the West. Its population in 1880 was 5271.

JEFFERSONVILLE, a city of Indiana, is in Clarke county, on the Ohio River, opposite Louisville, Ky., and 5 miles E. of New Albany. It is the S. W. terminus of a branch of the Ohio and Mississippi Railroad, and is on the Jeffersonville, Madison, and Indianapolis Railroad (operated by the Pennsylvania Company), which here crosses the river on an iron bridge nearly a mile long. The town also has railway communication with New Albany. The falls of the Ohio afford excellent and well-utilized water-power. The streets are regularly laid out with the uniform breadth of 60 feet. Jeffersonville is well supplied with churches, schools, banks, and newspapers. Among the manufactories are locomotive- and car-works, foundries, machine-shops, flour-mills, boat-yards, railway repair-shops, and establishments for making agricultural implements. One of the State penitentiaries is established here. The population in 1870 was 7254; in 1880, 9357.

JEFFRIES, John (1745–1819), an American physician, was born at Boston, Feb. 5, 1745. He graduated at Harvard College in 1763, studied medicine with Dr. Lloyd, and attended medical lectures in London and at the University of Aberdeen, obtaining his degree from the latter in 1769. Returning to Boston he practised with great success, and in 1771 was made surgeon of a British ship-of-the-line there. When the British evacuated Boston Dr. Jeffries went with Gen. Howe to Halifax, and was made surgeon-general of the forces in Nova Scotia in May, 1776. He went to England in March, 1779, and being there made surgeon-major to the forces in America, entered on his duties at Charleston, S. C., in March, 1780. He returned to London before the close of that year and engaged in scientific research. He is specially noted for his balloon voyage from Dover Cliffs across the English Channel. This voyage, undertaken for purely scientific purposes, he made on Jan. 7, 1785, in company with François Blanchard. On account of its success Dr. Jeffries was received with great honor by the savants of Paris. In 1789 he returned to Boston, where he again practised his profession and met with another remarkable adventure. He attempted to deliver a series of lectures on anatomy, but on the second evening of the course a mob broke into the room and carried off the subject, the body of an executed felon. Dr. Jeffries died at Boston, Sept. 16, 1819.

JENKINS, Edward, a British author, was born at Bangalore, India, in 1838. He is a son of Rev. John Jenkins, D. D., who afterwards became pastor of Presbyterian churches in Montreal and Philadelphia. Edward was educated in these cities, and when his father returned to Montreal he went to London, where he was called to the bar in 1864. In 1870 he was sent to British Guiana by the Society for the Protection of the Aborigines. In 1871 a sensation was produced by his story, *Ginx's Baby*, a satire on current social and economical maxims. This was followed by *Lord Bantam*, *The Coolie*, *Little Hodge*, and others. In 1874 Mr. Jenkins was made agent-general for Canada, and while abroad was elected to Parliament as a Liberal. In 1880 he retired from Parliament to devote himself to his profession.

JENKINS, Thornton A., an American rear-admiral, was born in Virginia, Dec. 11, 1811. He entered the navy as midshipman in 1828, and was employed in the office of the coast survey from 1834 to 1842. He then served in the Mediterranean and on the coast of Africa until 1845, when he went to Europe to examine the light-house systems of the commercial nations. He served on the coast of Mexico during the Mexican war, and afterwards in the coast survey until 1851. In the Paraguay expedition in 1858 he commanded the sloop-of-war Preble. In 1862 he commanded the sloop Wachusett in the James and Potomac Rivers. In Admiral Farragut's fleet off Mobile he commanded the second division, and afterwards was fleet-captain and chief-of-staff. He was the senior naval officer in command at the surrender of Port Hudson, July 7, 1863. Returning to the blockade of Mobile, he again had command of the second division of Farragut's fleet until the close of the war. He was then made chief of the bureau of navigation, and in 1869 became naval secretary of the light-house board, a position which he had held before the war. In 1870 he was promoted to be rear-admiral, and in 1871 was placed in command of the East Indian squadron. He was retired from active service in December, 1873.

JENNER, Sir William, an English physician, was born at Chatham in 1815. He was educated at University College, London, and entered upon general practice. In 1844 he obtained the degree of M. D., and in 1848 was appointed professor of pathological anatomy in University College, London, and in 1857 professor of clinical medicine. In 1861 he was appointed physician to the queen, and in 1863 physician to the Prince of Wales. In 1862 he became professor of the principles and practice of medicine. In 1868 he was made a baronet, and in 1872 K. C. B., in recognition of his services during the illness of the Prince of Wales. He has published many papers on fever, diphtheria, diseases of the heart, lungs, and skin, and on diseases of children. He is specially noted as the first to prove the difference in kind between typhus and typhoid fevers.

JEREMIAH. See Prophets.

JERROLD, William Blanchard (1826–1884), an English author, son of Douglas Jerrold (see Encyclopædia Britannica), was born at London in 1826. He was educated partly in France, studied painting in London, and illustrated some of his father's articles. He became a journalist, and also produced many farces and comedies. In 1852 he visited Sweden as a commissioner for the London Crystal Palace, and in 1855 attended the Paris Exhibition as commissioner of the London *Daily News.* He prepared a series of articles on the London poor for the *Morning Post* in 1862, and in 1863 went to Paris to examine its institutions for the poor, and in 1869 visited the Netherlands for the same purpose. Among his books are, a *Life* of his father (1859); *At Home in Paris* (1864 and 1870); *A Trip through the Vineyards of Spain* (1864); *The Cockaynes* (1871); *London*, illustrated by Doré (1872); *Life of Napoleon III.* (4 vols., 1874–80). He died March 10, 1884.

JERSEY CITY, a city of New Jersey, county-seat of Hudson county, is on the W. bank of the Hudson River, opposite New York, of which it may be regarded as a suburb. It occupies a part of the peninsula, having Hudson River and New York Bay on the E., and Hackensack River and Newark Bay upon the W. The city limits extend from river to river, and the S. part of the city has a considerable frontage upon each of the bays. North of Jersey City lie the city of Hoboken, the town of West Hoboken, and the township of North Bergen; southward the city of Bayonne, occupying the rest of the peninsula. Jersey City occupies a space about 5¾ miles long from N. to S., with an average breadth of nearly 3 miles. The ground along the Hudson River front is low and flat; along the Hackensack it is in part marshy; but the central part is high and rocky. Jersey City is a terminus of several railroads: the Pennsylvania, the Central of New Jersey, the Erie, the Delaware, Lackawanna, and Western, the Lehigh Valley Railroad, the New York, Susquehanna, and Western, and of some six or more minor and local railroads. The business of the place is largely connected with these railroads and with the transfer of their freights, since a large number of ocean steamers receive and discharge their lading at its wharves. Communication with New York is maintained by steam ferry-boats. The general appearance of the buildings is not attractive. In some of the poorer parts of the city the construction of many of the houses is bad. Although the plan of the streets shows a general conformity to a regular system, there are many departures from a completely rectangular plan. Among the principal buildings are the post-office, city-hall, court-house, the city hospital, Christ's hospital, 3 large hotels, and a noteworthy private club-house. There are 3 national and 4 other banks, 3 weekly and 2 daily newspapers, some 80 churches, and 21 public and many private and parochial schools. Among these schools are a business-college, St. Peter's College (Roman Catholic), and the Hasbrouck Institute. Jersey City has extensive manufactories of flour, oils, oakum, lumber, silk goods, drugs and chemicals, plumbago goods and tobacco, pottery, soap, castings, etc.; besides sugar-refineries, steel-works, and other industrial establishments in great number, some of them of the first magnitude. The city has extensive abattoirs, and a large interest in the preparation and packing of meats and provisions. The stock-yards and grain-elevators are among the largest and best arranged in the country. The gas- and water-works and the sewerage are well-managed and effective. There are 3 small public parks. The total property valuation is $100,000,000, or, by assessment, $61,000,000. The gross public debt is $18,000,000.

The site of Jersey City was called Paulus Hoeck by the early Dutch settlers. The first ferry to New York was established in 1764. During the Revolution it was held by British troops from 1776 to 1783. In 1802 there were only 13 inhabitants (exclusive of the settlements of Bergen and Communipaw, now included in Jersey City). In 1820 Jersey City was incorporated, but it still remained part of Bergen township until 1838, when it was made a distinct municipality. In 1851 the township of Van Vorst was added to it; Bergen and Hudson cities were added in 1869, and Greenville in 1873. The population in 1850 was 6856; in 1870, 82,546; and in 1880, 120,722.

JESSEL, SIR GEORGE (1824–1883), an English jurist, was born at London, in 1824, of Jewish parents. He was educated at University College, London, graduating B. A. in 1843, and M. A. in 1844. He was called to the bar at Lincoln's Inn in 1847, and in 1865 became queen's counsel. He was elected a senator of the University of London, and in 1868 was elected to Parliament for Dover as a Liberal. He was appointed solicitor-general by Mr. Gladstone in 1871, and was knighted in 1872. He was appointed master of the rolls in 1873, and was sworn of the privy council. He was the first Jew to hold a judicial position in England. During his tenure the duties of the master of the rolls were changed, and he became the usual president of the court of appeal. His memory of cases and quickness of apprehension were alike marvellous. In 1880 he was made vice-chancellor of the University of London. He died at London, March 21, 1883.

See Vol. XIII. p. 656 Am. ed. (p. 645 Edin. ed.).

JESUITS IN NORTH AMERICA. I. In all the remarkable history of the Society of Jesus from its birth in 1540 till our day, there is no more brilliant chapter than that which records its career in North America. As far back as 1611 Fathers Biard and Massé formed part of the expedition that laid the foundations of Acadia. In 1625 the infant colony of Quebec received the ministrations of the Jesuits who were called upon by the original Recollet missionaries to take part in their labors and share their apostolic triumphs. They took up their abode in the valley of the St. Charles, close to the confluence of that stream with the Lairet, and there established the famous house of Notre-Dame des Anges, which became the nursery of their order in America. Four years later, upon the capture of Quebec by Sir David Kirke and his two brothers, the mission was suspended and the fathers were transported to Europe, only to return, however, in 1632, when the French recovered hold of the St. Lawrence. Their first step was to open a school, and from 1635 the College of Quebec may be said to date its origin. Missionary work went apace. Three Rivers was soon occupied and Father Vimont formed one of the historic group that stood around the valiant Maisonneuve in 1642, when he set foot upon the valley where now stands Montreal. Thenceforward the name of a Jesuit will be found associated with every important event of New France—administration, diplomacy, exploration, discovery, spiritual labor, and martyrdom. The *Relations* of the Jesuits present the most thorough history of the colony for 40 years, and had the publication of the volumes been continued, they would have furnished a continuous record down to the conquest by the British in 1759–60. The *Journals* of the order were even more minute, setting down domestic and other details from day to day, and the preservation of the single pamphlet which has survived shows how irretrievable is the loss of the voluminous remainder.

In 1634 the celebrated Huron mission was established. Fathers Breboeuf, Daniel, and Davost set out from Quebec with a band of Indians for guides. Their way lay in canoes up the St. Lawrence to Montreal; up the Ottawa to Lake Nipissing; down French River into Georgian Bay, until, after more than a month of toil and hardship, they cleared 900 miles and found themselves in the Huron country, near the shores of the lake of that name. This was the first great American mission, and it forms one of the most dramatic episodes in the history of New France and of the Jesuit order. The fathers lost no time in building a central mission house where they could meet the chiefs of the different tribes on solemn occasions, and whence they could go forth to visit the settlements scattered along the northern shores of Lakes Erie and Ontario, and in the intervening peninsula where dwelt the neutral nation that stood as a barrier between the rival races of Iroquois and Huron. Fifteen eventful years were spent in evangelical work, with results of the most satisfactory character. The number of neophytes grew from year to year, morals were improved, superstition gradually weakened, and the material condition of the tribes was ameliorated by the practice of farming and a large traffic of furs with the French of Montreal and Quebec. But all these bright prospects were suddenly blasted. In 1649 the terrible Iroquois made an irruption upon the Huron villages, sweeping everything before them. Cabins were burned, corn-fields devastated, women and children driven into captivity, and the hapless braves scattered into the marshes of the lakes. The ruin of the Huron nation entailed the fall of the Jesuit mission, and that fall was consecrated by the cruel death of Fathers Breboeuf and Lalemant at the stake, and of Fathers Garnier and Chabanel under the stroke of the tomahawk.

It was a less promising and even more dangerous task to attempt the conversion of the Iroquois, but the Jesuits were equal to it, and the great figure of Isaac

Jogues will ever be associated therewith. The father's first experience of these Indians was his capture by them near Three Rivers, his exile in their country at Lake George, where he was the first white man that set eyes upon that beautiful expanse of water, and the frightful tortures which he endured at their hands. In 1646 he singled out the Mohawk branch of the Iroquois nation as the field of his labors, and the more safely to attain his end he went forth in the garb of a civilian. Having succeeded in enlisting the good-will of the people he was encouraged to undertake a third expedition, which terminated in the terrible catastrophe of his death. A fellow-victim of Mohawk atrocity, about the same time, was Father Bressani, whose account of his sufferings is almost incredible.

Besides their establishments at Montreal, Three Rivers, Montreal in the Huron country, and occasional expeditions into the land of the Iroquois, the Jesuits had a missionary post in the Island of Miscou, on the Gulf of the St. Lawrence, near the entrance of the Bay of Chaleur, and another at Tadousac, near the mouth of the Great Saguenay River. In 1646 the Abnakis, a tribe of the Algonquins living on the Kennebec River, in the present State of Maine, called at Quebec for a "Black Robe," and Father Druilletes was sent out to evangelize them. His labors were fruitful and extended over a broad field, as he descended the Kennebec from Norridgewock to the first English post, the present site of Augusta. He went down thence to the sea, following the coast in a canoe to the Penobscot, where he visited seven or eight other English posts and was hospitably entertained at each. Two years later, the colony of Massachusetts having applied to the French authorities of Quebec for a treaty of commercial reciprocity, Druilletes was deputed as commissioner. He was well received at Augusta, Boston, Roxbury, Plymouth, and Salem, and returned to Quebec with such hopeful tidings that in 1649 he was despatched to the commissioners of the four colonies in session at New Haven, where he once more urged interchange of trade between New England and New France, and asked English protection for the Abnakis of the border. This mission proved abortive, however.

If we turn from apostolic soil to the field of discovery and exploration, we shall find the Jesuits connected with the geography of almost all the northern portion of North America. When any of the governors at Quebec projected an expedition of this kind, they invariably appointed a Jesuit to accompany it, if he did not lead it. The famous intendant Talon, having resolved to take possession of the vast valley of the Ottawas, in the name of the king of France, chose Father Claude Allouez as colleague of M. de Lucson, and at the great meeting of tribes held at Sainte-Marie-du-Saut, in 1671, the missionary took a chief part in the ceremonies. In the next year Hudson's Bay was rediscovered by the French. The expedition which achieved this important result was headed by M. de St. Simon and Father Albanel. Not content with seeking the great North Sea, Frontenac and Talon were intent on discovering the South Sea, which also, strangely enough, was to conduct to the region of Cathay. For this purpose two notable men were sent forward, Joliet, a Quebec merchant, and Father Marquette. They wintered at Machelimackinac, and early in the spring advanced into the country of the Illinois, passing by way of Fox River and the Wisconsin into the Mississippi, which they reached on June 17, 1673. They then descended the Mississippi as far as the confluence of the Arkansas, but returned to winter at St. Francis Xavier, a missionary station on the west of Lake Michigan. In 1681 La Salle descended the Mississippi to the Gulf, but the glory of the discovery of the Father of Waters, which is in American eyes the greatest achievement next to the discovery of America, is forever connected with the name of Marquette.

As was stated above, the *Relations* of the Jesuits are incomplete; the publication of their laws ceased in 1672, at the request of Courcelles, the successor of Frontenac, and the subsequent history of the order in North America becomes comparatively obscure and fragmentary. From other sources, however, it is known that they continued their work with undiminished zeal and gratifying success for the next hundred years. Charlevoix, himself a member of the society, who visited Canada in 1720, testifies in no measured terms to the eminent services of his brethren. It was only four years afterward that at Norridgewock, in Maine, Father Sebastian Rasle was shot down on the battle-field surrounded by his Abnakis neophytes. The College of Quebec, after flourishing for nearly 150 years, received a first blow at the conquest of New France by the English in 1769, and the Treaty of Paris in 1763, and was still further crippled by the suppression of the whole Jesuit order, in 1773, through a bull of Pope Clement XIV. Father Well, the last survivor in Montreal, died in 1791; and Father Cazot was the last in Quebec, passing away in 1800. In 1776 the British government appropriated a part of the College of Quebec as a repository for records. It was deemed by the authorities an act of courtesy to leave the surviving members of the order in quiet possession of the remainder; but, when all these had departed, the crown proclaimed itself heir at law, by default, of the property. The college was turned into a barracks, and served as such until England withdrew her troops from Canada in 1869. The venerable pile was untenanted for a time, until it was torn down, in 1880, by order of the Provincial government. Dynamite had to be used to destroy the massive walls. This property, with other large tracts at Three Rivers, Montreal, and elsewhere, summing up thousands upon thousands of acres, is at present the subject of curious and important litigation between the Provincial authorities at Quebec and the Vatican. The *Biens des Jesuites* may lead to very serious controversy in Canada, as in other Catholic countries.

II. Exactly where the work of the Order of Jesus ends in New France it begins in the United States. And a further coincidence is that, whereas the Jesuits may be said to have founded the Church of Canada, the parent of the Roman Catholic Church in the American Union was a son of Loyola. Father John Carroll, brother of Charles Carroll of Carrollton, was a Jesuit who retained an ardent devotion to his society, notwithstanding its suppression. While attending to pastoral duties in Maryland, he was called to promote the cause of the colonies, and went to Montreal, in 1776, in company with his brother and Benjamin Franklin and Samuel Chase, in an ineffectual attempt to draw the French Canadians into alliance with the Continentals. Toward the end of the century he was in brisk correspondence with the Holy See for the purpose of establishing a hierarchy in the United States. His scheme was accepted, and he himself was appointed first Bishop of Baltimore. His successor was Father Neale, another Jesuit. With the Jesuit instinct for education, Carroll sought the means of establishing a seat of learning, and chose a site immediately west of Georgetown, in the District of Columbia. He put up the first building in 1789, and the schools were opened about two years thereafter. In 1815 the college was chartered as a university by act of Congress, and in 1833 it was empowered by the Holy See to confer degrees in philosophy and theology. The university has prospered ever since, and is now not only the largest establishment of its class in the order, but worthy to rank with the best throughout the land. There are several offshoots of Georgetown, chief among which may be mentioned the College of the Holy Cross, in Worcester, Mass. The Maryland Jesuits have other houses in Frederick, Baltimore, Washington, and different parts of the South-eastern States.

In the spring of 1823, ten young men, under the guidance of two priests, left White Marsh, Prince

George's co., Md., and journeyed to Wheeling, where they purchased two flatboats and floated down the Ohio to Shawneetown, below the mouth of the Wabash. Thence they crossed the prairies of Southern Illinois, on foot, as far as St. Louis. These youths formed the Jesuit colony included in the present province of Missouri. They took possession of a farm in the beautiful valley of Florissant, a few miles outside of St. Louis, where they opened a school for Indian boys, and laid out stations at Portage des Sioux and St. Charles, on the Missouri. In 1828 they resorted to the usual Jesuit device of founding a college, which was the first scholastic institution west of the Mississippi, and which, under the name of St. Louis University, stands high on the roll of American institutions. This college soon multiplied itself. In spite of their paucity of numbers the Missouri fathers found means to establish similar schools in Cincinnati, Louisville, Bardstown, Ky., Grand Coteau, La., Chicago, Milwaukee, Detroit, and Omaha. They have also auxiliary stations in all the important towns of the West. Nor were their efforts confined to the settlements. They penetrated into the Indian territory; beginning with the Pottowattomies, ascending the Missouri to the Sioux encampment, and the Yellow Stone to the Blackfeet; crossing the Rocky Mountains with the Flatheads, and debouching into the valley of the Columbia. Among many devoted missionaries the great figure of Father P. J. De Smet rises predominant. He enjoys a national reputation from having been deputed on several occasions by the U. S. government to pacify the Indians when they were roused to acts of violence by the cupidity and injustice of agents, or by sharp traders who had swindled or robbed them. Father De Smet also received from the government the exclusive right of nominating agents for Catholic tribes. In forty years of wandering he travelled over 100,000 miles, collected in Europe 1,000,000 francs for his missions, and induced a hundred young men to offer themselves to the province of Missouri, with the view of evangelizing the Indians.

The revolutionary troubles of Europe in 1847–48 made it necessary for the Jesuits, in places where they were driven from their colleges, to seek refuge in foreign lands. Many of these came to the United States, adding strong reinforcements to the provinces of Maryland and Missouri. A number of them went still farther, and in 1854 began a large mission in California, which has since spread into Oregon and New Mexico. The College of Santa Clara, near San Francisco, is second to no other on the Pacific coast. A band of French Jesuits took possession of St. Mary's College, Marion co., Ky., in 1833, and laid the foundation of another college in Louisville during the summer of 1845; but early in 1846 they left this to take charge of St. John's College, N. Y., and also to establish a college for externs in New York city. About the same time a colony of fathers emigrated to Louisiana, where they opened a house in New Orleans, and took over the flourishing College of Springhill, near Mobile, Ala. They have since added several stations throughout the South-west.

In this general movement it was not to be expected that the old Canadian ground would be forgotten; indeed, the wonder is that it was not reoccupied on the restoration of the order by Pius VII. in 1814. But in 1839, after an absence of nearly 40 years, the Society of Jesus appeared once more on the banks of the St. Lawrence, and in 1845 the venerable College of Quebec was replaced by St. Mary's at Montreal, unrivalled among the many flourishing institutions of the Dominion. In 1865 the fathers opened their beautiful church in the same city, and point to it with pride as the counterpart of the Gesù, the mother temple of their society in Rome. Old Quebec has also its Jesuit residence, and in 1885 the College of St. Boniface, opposite Winnipeg, in Manitoba, was made over to the disciples of St. Ignatius.

It will thus be seen that the Jesuits are fully represented by schools, colleges, parishes, residences in every portion of North America, including nearly every State in the Union and Dominion of Canada, while their missionary stations are scattered throughout the Territories of the West and North-west. Putting priests, scholastics, novices, and lay-brothers together, their total number is not far below one thousand, while the number of pupils under their charge represents a mental and moral influence which must be taken into account in counting the factors of American civilization. Neither may this influence be regarded as ephemeral. The Order of Jesus has become implanted in the country and identified with all the possibilities of its future. Its members are no longer only natives of European countries, but recruits are every year made from the most gifted and promising of native youth. A central institution has also been founded in which all the traditional principles of the society are inculcated, the time-honored discipline of the body is enforced, and the higher education, for which the company has always been renowned, is developed to its fullest extent. This college is located at Woodstock, Md. It is designed for the instruction of the young Jesuits, who are afterward to be employed in the schools, missions, and other works conducted by the society throughout the United States and Canada. Here they are carried through a thorough course of philosophy, physical science, mathematics, and theology with a view of preparing them for all priestly ministrations and for teaching the higher branches of learning in the different colleges. The Jesuit pioneers and missions of the United States and Canada unite to sustain the common scholasticate, both for the sake of economy and for the advantage of more systematic and perfect training of their young members. (J. L.)

JETTY (Fr. *jetée*, from the Lat. *jacio*, to throw; hence, something thrown out). As used in coast-engineering, the term jetty has a tolerably well-defined special meaning. A *pier* or *mole* is an embankment attached at one end to the land, and designed to create an artificial harbor, or to improve or increase harbor facilities already existing. A *breakwater* is commonly detached completely from the land, or it may be connected with the shore by a pier. *Jetties*, in the modern use of the term, are usually built in pairs, one on either side of a river mouth; and they are designed to contract the river current, and to intensify its effects in such a way that it shall scour away the mud and sand of the bar and thus deepen the channel. Many of the river-mouths, along the shores of the great North American lakes, have been converted into artificial ports by harbor-works embodying the principle of the jetty-system. The mouths of many British rivers have likewise been deepened by the construction of jetties, or "parallel piers," as they are sometimes called. A noteworthy example of the good effects of improvements of this kind is shown in the case of the Russian River Dwina, which flows into the Gulf of Riga. Its jetties are more than a hundred years old. They have permanently deepened the channel, which at the time of their construction was but 6 feet deep, to the depth of 18 feet; and it is said that there are no signs of the advance of the bar. Before 1776 jetties were thrown out at the mouth of the Oder, in Germany, which deepened the entrance to 24 feet, from its original depth of 7 feet. During the construction of the recently-opened new water-way to Rotterdam, a new mouth was cut for the river Maas (Meuse), at the sea-end of which jetties were built out into the sea. These soon gave the new river-mouth a depth of 17 feet. In this case the jetties were built of willow mattresses, put down in layers, each layer being weighted with stone. This work has special importance from the fact that it stands upon an open shore of sand, and is exposed to heavy storms, which it has thus far withstood with no serious damage, the jetties being held in place by stout piles of oak driven through them. A still more celebrated instance of the successful employment of the jetty system for a similar purpose is that of the Sulina mouth of the Danube. The Sulina discharges only two twenty-sevenths of the ordinary outflow of the main stream. The jetties were commenced in 1858 and finished in 1861. The first works were of crib-work, piles, and rubble-stone; but these were so damaged by the sea that finally they had to be replaced (1866–71) by solid structures formed of concrete blocks. Here the original depth, from 7 to 11 feet, has been permanently increased to at least 20 feet. More than twenty other European rivers could be named whose mouths have been permanently deepened by similar methods; and in some of them the improvement has been of the most satisfactory character. Wherever non-success has been reported, the most general cause appears to have been failure to extend the jetties far enough to seaward. The best results have been obtained where the works have been so much extended as to carry them beyond the bar, and thus to pour the outflowing current directly into deep water. Anything short of this may only result in carrying the bar itself further out to sea. A fine instance of the application of the jetty principle to harbor improvement is seen in the Manora Breakwater (which is really a jetty), at Kurrachee, in India, and in the other highly successful harbor improvements at that place.

The most conspicuous example of jetty construction in the United States, and one of the most successful and important undertakings of the kind in the world, is seen in the engineering works recently carried out at the mouth of the South Pass, one of the outlets of the Mississippi River. Previous attempts at the improvement of the navigation of the Mississippi River at this point had failed to give a depth of more than 18 or 20 feet. (See MISSISSIPPI RIVER in the ENCYCLOPÆDIA BRITANNICA.) The jetties were commenced in 1875 in accordance with an act of Congress of March 3, 1875, authorizing their construction. A contract was made by the government with Capt. James B. Eads, one of the earliest and most earnest advocates of the improvement by jetties, who agreed to create and to maintain for 20 years, in the South Pass, a channel 30 feet deep and 350 feet in width, the jetties to be not less than 700 feet apart, and to be of thoroughly permanent and substantial construction. For this work Capt. Eads was to receive $5,250,000 if he obtained the depth of 30 feet, and an annual sum of $100.000 for every year, during 20 years, that said depth should be maintained. When a channel of 20 feet should be got, with a width of 200 feet, $500,000 were to be paid; when the channel should deepen to 22 feet, $500,000 more were to be paid; and the same amount again when it reached 24 feet. Smaller instalments were to follow in like manner until the maximum depth should be permanently gained. It is but just to say that Capt. Eads had from the first greatly favored the selection of the South-west Pass, instead of the South Pass, for improvement. It is also fair to state that Eads' plans had been from the first strenuously opposed by nearly every member of the official board of engineers which had been appointed to consider the proposed improvements. The time, however, had plainly come when action must be taken. The greatly increased tonnage and draught of the ocean steamers of recent years had made the deepening of the river mouth an imperative necessity. The commerce of New Orleans, and of the South-west in general, was already languishing on account of the obstructions in question. The opposition to Eads' plans came, as it would appear, largely from the engineer officers of the army, to whom hitherto enterprises of this character had been for the most part intrusted. The opposition led to exciting controversies on the subject. The merchants of New Orleans generally favored the construction of a ship-canal to the sea, and based their judgment on the fact that the attempt in 1856 to jetty the South-west Pass had been unsuccessful. The actual work of constructing the jetties was commenced June 17, 1875. The operations were carried on under the partial supervision of an advisory board of seven distinguished engineers, one of whom was Sir Charles A. Hartley, who had been chief-engineer of the Danube Commission. Of this board Gen. J. G. Barnard was the president.

The South Pass itself is 12 miles long, 700 feet in mean width, 34 feet in mean depth, and naturally discharges about 10 per cent. of the outflow of the Mississippi. The crest of the bar is 2½ miles to seaward from its mouth, and formerly advanced southward 100 feet every year. On either hand the pass is walled by narrow banks of mud. On the N. E. side expands what is called Garden Island Bay, and on the S. W. side is East Bay, so called to distinguish it from West Bay, which lies further to the N. W. South Pass is the smallest and most central of the 3 main outlets of the river, Pass à L'Outre being to the eastward, and the South-west Pass (the largest) to the westward. The course of the South Pass is towards the S. E., and is nearly straight. The sea at this pass has very feeble tides. The banks of the pass, between the channel and the bays on either hand, are from 300 feet to half a mile in breadth. The substance of the banks is a marshy mud, covered with reeds. During the construction of the jetties there sprang up quite a town just above the mouth of the pass, called Port Eads. The town stands on both banks of the pass.

The east jetty extends 12,100 feet, or nearly 2½ miles to seaward; the west one is rather shorter. The general principle of construction was much the same as that observed in building the jetties for the Maas. Willows for making the mattresses were obtained in vast quantities from the sub-delta known as "the jump," 12 miles above the head of the passes. Straight willow rods from 15 to 30 feet long, and not in any case much over 2½ in diameter at the butt were chosen, and the brushy tops were left on them. They were brought to Port Eads in barges, some of which carried as much as 600 cords to a load. The mattresses, many of them 100 feet long, were constructed on a novel plan, patented by Mr. Eads, and one by which they were much more swiftly made than by any previous method. The mattresses, each about 2 feet thick, were towed by a steam-tug to their place, and were sunk there by placing rubble stone evenly upon them. The greater part of the stone used was brought down the river from the quarries at Rosiclair, in Southern Illinois. The course for each jetty was first marked out by lines of guide piles. After the crest of the bar was reached it became necessary to make the work far more massive, and its foundation courses are much broader and thicker. For the greater part of the length four courses of mattresses and stones were laid. Towards the seaward ends it was deemed necessary to protect the work by cribs of palmetto logs filled in with stone. On the outside of the jetties the sea has shoaled very remarkably since their construction, thus adding vastly to the permanency of the work. Within the jetties some shoaling has also taken place on either side of the channel; but this is an advantage, since it will doubtless protect them from being undermined by the current. Towards the landward end some portion of the work was constructed of yellow pine sheet piling; but as the current tended to undermine this work it had to be protected by willow mattresses lowered between the rows of piles. Subsequently an "inner east jetty" was built to reinforce this part of the original jetty. The west jetty is connected with the mainland by a dam of willow mattresses 550 feet in length, and running at right angles with the main work. The second jetty was finished to the low-water mark about April 1, 1876. Temporary wing-dams or spurs were afterwards built inside to hasten the erosive action of the current, and they served their purpose well. Three years after the jetties were laid, and after the work was well settled together, they were capped towards their seaward ends with huge blocks of concrete, and their sides were further protected with a revetement of stone and gravel.

Not the least important part of the works for deepening the pass are those for removing the shoals formerly existing at and near its head. This end has been attained by constructing sunken dams or sills of mattresses and stones across the heads of each of the two larger passes, and by building dykes which have directed the current into the South Pass. The Grand Bayou, a side-outlet of the pass, was also closed by a dam. The general result, as shown by the latest reports, has been the attainment and maintenance of the full results intended. The jetties, however, are still settling, though very slowly, and there is reported some evidence of a slight shoaling to seaward. If this shoaling continues it will eventually necessitate a further extension of the jetties. It is believed, however, that the Gulf current, which flows uninterruptedly from west to east, will prevent extensive shoaling. Since the completion of the South Pass jetties several other river and harbor mouths have been improved in a similar way. (C. W. G.)

JEVONS, William Stanley (1835–1882), an English political economist, was born at Liverpool, Sept. 1, 1835, being a grandson of the historian, Roscoe. He was educated chiefly at University College, London. Receiving an appointment in the mint at Sydney, he spent five years in Australia. He then visited the United States, and on his return to England received the master's degree from the University of London. In 1866 he was appointed professor of logic, political economy, and mental philosophy at Owen's College, Manchester. In 1875 he was called to the chair of political economy at University College, London. He was also connected with the University of Cambridge as examiner in philosophy. In 1881 he gave up his professorship to devote himself entirely to literary work. He was accidentally drowned at Bexhill, Aug. 13, 1882. His first publication was *A Serious Fall in the Price of Gold* (1863), which treated of the economic results of the gold discoveries in California and Australia. Next, in *The Coal Question* (1865), he called public attention to the probable exhaustion of the British coal mines. He then turned to logic, and popularized Boole's application of geometrical formulæ to universal logic. He also prepared an excellent *Elementary Treatise on Logic* (1870). His *Theory of Political Economy* (1871) was another ingenious attempt to apply his favorite mathematics to branches of science formerly supposed incapable of being so treated. This extension of mathematics took its widest range in his *Principles of Science* (1874). With all his fondness for mathematical formulæ he had an admirable gift of discussing scientific questions in a clear and popular way. This is seen in his excellent work on *Money* (1880). One of his latest publications was *The State in Relation to Labor* (1882). He also contributed to various periodicals valuable essays on social, economic, and statistical subjects.

See Vol. XIII. p. 708 Am. ed. (p. 697 Edin. ed.).

JOB, Book of. In America scientific criticism of this book has hardly yet made more than a beginning. The majority of American commentaries are concerned rather with the practical teachings of the book than with the critical problems which it suggests or its literary phenomena. Where the latter questions are discussed it is often from the standpoint of a non-critical dogmatism which contents itself with the simple reassertion of traditional views without respect to new inquiries. Critical scholars in America, moreover, while in no respect bound by merely traditional opinions, have always occupied a less radical position in relation to the Book of Job than their European brethren. All attempts to dissect the book have been looked upon with disfavor. It has not only been thought necessary by some, for the integrity of this portion of Scripture, to maintain that the prose prologue and epilogue formed constituent parts of the drama in its original form (as the present writer believes them to have done), but the same claim is made for the episode of Elihu (Job xxxii.–xxxvii), which seems to have little vital connection with the development of the main line of thought. The mythological allusions, perfectly natural in the mouth of a non-Israelite such as the hero of the poem seems designedly represented to be, are explained in strained senses; and Ezekiel and the New Testament are cited to prove the literal historicity of the prologue and the epilogue. Prof. Tayler Lewis, while holding Job to be essentially a dramatic poem, claims that it is also characterized by "substantial historical verity." There has also been a general tendency among American scholars to maintain an early date for Job, on account of the occurrence of archaic forms of speech and a (presumed) ignorance of post-patriarchal revelation on the part of the author and the persons of the drama.

In some respects the most ambitious work upon Job which has appeared in America is *The Book of Job*, by the Rev. Dr. T. J. Conant. This consists of "Authorized" version and of the Hebrew text, with a new translation, notes, and an introduction. The translation is non-rhythmical in form, but accurate and suggestive in content; and Dr. Conant's philological notes are of great value. In particular, the examination of the alleged peculiarities in the language of Elihu is worthy of attention. Dr. Conant's general position with regard to Job is moderately conservative. Dr. Conant is not inclined to regard the sublime poetry of this book as the verbatim report of an actual historical discussion, nor even to ascribe to the persons in the debate all the sentiments which the author puts into their mouths. Dr. Tayler Lewis' *Rhythmical Version of the Book of Job*, in the eighth volume of the *Schaff-Lange Commentary*, is excellent in its fidelity to the poetical spirit of the original; the notes make available for the illustration of Job the author's extensive classical culture; and the introduction is distinguished by an intelligent conservatism and by a sympathetic insight into the spirit of the poem. The best specimen of a purely homiletical treatment of the book of Job by a competent critical scholar is Prof. W. Henry Green's *Argument of the Book of Job Unfolded.* Dr. Green traces the successive stages of the temptation of Job, his struggle, and his triumph, without discussing critical questions, but on the simple acceptance of Job as a book of inspired Scripture. Prof. Green's relation to traditional interpretation is independent. Cowles, in *The Book of Job*, re-states, with considerable emphasis, the argument for the Mosaic authorship. Burr, in Whedon's general *Commentary*, shows a better appreciation of the problem, and leaves the question of authorship and date undecided. (J. T. N.)

JOGUES, Isaac (1607–1646), a French missionary, was born at Orleans, Jan. 10, 1607. He became a Jesuit at Rouen in 1634, and was ordained in 1636. Sent to Canada, he reached Quebec in July, and went to the Huron country, where he spent several years. In 1642, with Father Raymbault, he crossed Lake Huron and founded a mission among the Chippewas. Returning in August to Quebec for supplies, his party were captured by the Mohawks. He suffered great cruelties, and though the Dutch tried to secure his release he remained in slavery and in danger of death until August, 1643. Escaping then to Albany, he passed on to New Amsterdam (now New York), where he was treated kindly by Gov. Kieft. He sailed for Europe in November, and was received in France with great consideration. He returned to Canada in time to witness the negotiations with the Iroquois at Three Rivers, in July, 1644. In May, 1646, he went to conclude the treaty, and on his way visited Lake George, which he named Lac St. Sacrement. In September he returned to the Mohawk country to establish a mis sion, but was seized and put to death as a sorcerer, Oct. 18, 1646. His *Letters* have been published by the New York Historical Society (1847–48), and his *Novum Belgium*, edited by J. G. Shea (1862).

JOHNS HOPKINS UNIVERSITY, an institution of learning at Baltimore, owes its existence to the munificence of Johns Hopkins, who bequeathed for its foundation land and stocks estimated in value at more than $3,000,000. The university was incorporated under the laws of the State of Maryland, Aug. 24, 1867, and it was opened for instruction in September, 1876. Daniel Coit Gilman, LL. D., who had previously been president of the University of California, was chosen president of the Johns Hopkins University in 1875, and still holds that position. The philosophical faculty (of letters and science) is now fully organized and its department is in successful operation. Systematic instruction is offered in English, Anglo-Saxon, German, French, Italian, Spanish, Latin, Greek, Sanskrit, Hebrew, Arabic, and in other languages and literatures; in pure and applied mathematics; in chemistry (inorganic and organic), with laboratory work; in physics (including mechanics, light, heat, sound, electricity, magnetism, etc.), with laboratory work; in biology (including physiology and morphology), with laboratory work; in mineralogy and geology; in ancient and modern history; in physical geography; in political economy and the elements of international law; in logic, ethics, psychology, pedagogics, etc. Occasional courses of lectures are also given upon special themes in literature, science, history, archæology, art, etc.

Library and Laboratories.—There are three scientific laboratories, fully equipped. For chemistry there is a special building arranged for about ninety workers, and well adapted to all kinds of chemical and mineralogical work. A large building has been recently constructed for a biological laboratory, with complete arrangements for physiological and morphological work. The physical department is furnished with apparatus selected both for demonstration and investigation, and especially valuable for researches in electricity, magnetism, light, and heat. The construction of a new building for a physical laboratory is now under way.

The library contains over 27,000 bound volumes, and 750 serials are regularly received.

Publications.—The following publications are regularly issued under the auspices of the university: the *American Journal of Mathematics*, quarterly; the *American Chemical Journal*, bi-monthly; the *American Journal of Philology*, quarterly; *Studies from the Biological Laboratory; Studies in Historical and Political Science*, monthly; *Johns Hopkins University Circulars*, containing reports of scientific and literary work in progress in Baltimore.

Fellowships and Scholarships.—Twenty fellowships, each yielding $500 and exempting the holder from all charges for tuition, are annually open to competition.

In accordance with the request of the founder of the university Hopkins scholarships are annually conferred upon matriculated undergraduate students from Maryland, Virginia, and North Carolina.

Degrees.—The university confers the degrees of doctor of philosophy and bachelor of arts. Up to the end of 1885 the former had been conferred on 57 persons and the latter on 88. In 1885–86 the academic staff included 46 teachers, and the number of students enrolled was 312, of whom 181 had already taken their first degree and 131 were undergraduates.

JOHNSON, **Reverdy** (1796–1876), an American lawyer, was born at Annapolis, Md., May 21, 1796. He was educated at St. John's College in that city, and studied law with his father, who was a judge. Being admitted to the bar in 1815, he soon after settled in Baltimore, and became prominent in his profession. He assisted in reporting the decisions of the Maryland court of appeals (1820–27). He was a State senator from 1821 until 1825, when he resigned on account of the pressure of his professional duties. He was U. S. Senator from 1845 until 1849, when he was appointed by Pres. Taylor attorney-general of the United States. He resigned this office on the accession of Pres. Fillmore, and resumed the practice of law. He was strongly attached to the Union, and was a member of the Peace Convention which assembled in Washington in February, 1861. He was again elected to the U. S. Senate in 1862, and took prominent part in the discussion of matters relating to the conduct of the war and the reconstruction of the Southern States. In June, 1868, he was appointed U. S. Minister to England, where, with Lord Clarendon, he framed a treaty for the settlement of the Alabama claims, which was afterwards rejected by the Senate. He was recalled in 1869. He died at Annapolis, Md., Feb. 10, 1876.

JOHNSON, **Richard Mentor** (1780–1850), an American soldier, was born near Louisville, Ky., Oct. 17, 1780. He was educated at Transylvania University and became a lawyer. In 1803 he was elected to the State legislature and in 1807 to Congress. In the war of 1812 he became colonel of a body of mounted riflemen, whom he led to the Canada frontier. After attending the session of Congress he raised a mounted regiment to serve against the Indians. Joining Gen. Harrison in September, he assisted in the pursuit of Proctor, and his gallant charge in the battle of the Thames, Oct. 5, secured a victory over the British. The Indian chief, Tecumseh, is commonly reported to have fallen by Col. Johnson's hand. The latter was desperately wounded, but recovered so as to be present in Congress in the following February. In 1819 he was elected to the Senate, and in 1829 he again returned to the lower House, where he was a member till March, 1837. He was Democratic candidate for the Vice-Presidency in 1836, Martin Van Buren being the candidate for President. Of the 294 electoral votes, Van Buren received 170 and Col. Johnson only 147. As this was not a majority the Senate then elected him to the office, as required by the Constitution. After serving four years he was again a candidate in 1840, but was defeated. He then retired to his farm in Scott co., Ky., and took but little part in public affairs. He died at Frankfort, Ky., Nov. 19, 1850. He was the author of the law abolishing imprisonment for debt in Kentucky, and also conspicuous in his advocacy of the Sunday mail transportation.

JOHNSON, **Samuel** (1696–1772), an American clergyman, was born at Guilford, Conn., Oct. 14, 1696. He graduated at Yale College in 1714, and was active in the removal of the college from Saybrook to New Haven. In 1719 he resigned his tutorship, and in 1720 was ordained pastor of the Congregational church at West Haven. Study of early church history led Johnson and his friends Brown and Cutler, the latter being president of Yale College, to the investigation of the systems of church government, and finally to such preference for episcopacy that they relinquished their positions and sailed to England in 1722 to obtain ordination in the Church of England. Having taken the degree of M. A. both at Oxford and Cambridge, Johnson returned to Connecticut, as a missionary of the Society for the Propagation of the Gospel in Foreign Parts. He settled at Stratford, and published many controversial tracts, but his efforts met with little favor among the people. Nor was he more successful in obtaining from the English authorities what he considered essential to the welfare of the cause he advocated—the establishment of an American episcopate. He was a student of philosophy and zealous in behalf of education. He obtained for Yale College the gift of many valuable books from Bishop Berkeley and a deed of his farm at Newport, R. I. Afterwards when King's College (now Columbia) was established in New York in 1754 he accepted its presidency and did much to secure gifts for its endowment. Retiring in 1763 he returned to his parish at Stratford, where he died, Jan. 6, 1772. He published a *System of Morality* (1746) and a *Hebrew Grammar* (1767).

JOHNSON, Samuel (1822–1882), an American clergyman, was born at Salem, Mass., Oct. 10, 1822. He graduated at Harvard College in 1842 and at its Divinity School in 1843. Though he never connected himself with any religious denomination he was a Unitarian in theology, and became pastor of a Free Church in Lynn, Mass., in 1853. He was active in the anti-slavery movement and in social reform. He also lectured and wrote on philosophy and religious subjects. In connection with Rev. Samuel Longfellow he compiled a *Book of Hymns* (1846), in which some of his own were included. He also published *The Worship of Jesus* (1868). But his special life-work was the preparation of three volumes on *Oriental Religions: India* (1872); *China* (1877); *Persia* (1885). These were based on a thorough study of the best authorities on the literature of those countries, Mr. Johnson not being acquainted with the Oriental languages. He died at Salem, Mass., Feb., 1882.

JOHNSON, Sir William (1715–1774), a British colonial general, was born at Warrentown, county Down, Ireland, in 1715. Trained for a mercantile career, he received from his uncle, Sir Peter Warren, the management of a large estate in the valley of the Mohawk, N. Y., in 1738. Settling at Warrensburg, 24 miles W. of Schenectady, he engaged largely in trade with the Iroquois, learned their language, was adopted in their tribe and chosen sachem. Gov. Clinton also recognized him as colonel of the Six Nations, and in 1746 he was made commissary of New York for Indian affairs. He used his influence with the Indians strongly against the French. In 1754 he attended the congress at Albany and the council then held with the Indians. In 1755 Johnson was commissioned by Gen. Braddock as superintendent of the Six Nations, and with the rank of major-general was placed in command of the provincial forces sent against Crown Point. In September he defeated the French under Baron Dieskau, at Lake George, and thus somewhat retrieved the disaster of Braddock's defeat in July. Though wounded in the battle, he remained on the field. For his services he was made a baronet and received £5000 from the British Parliament. His commission as Indian superintendent was confirmed by the king, and he held this office for the rest of his life with a salary of £600 paid by Great Britain. He took part in various enterprises against the French, and in 1759 succeeded Gen. Prideaux in command of the expedition against Fort Niagara, and compelled the surrender of the fort. He was present at the capitulation of Montreal and the surrender of Canada in 1760. For his important services throughout this war he received a grant of 100,000 acres north of the Mohawk. In 1763 he rendered further service by restraining the Six Nations from joining the conspiracy of Pontiac. In 1743 he had built Fort Johnson, a stone dwelling on the north side of the Mohawk. In 1764 he built Johnson Hall, a wooden building a few miles farther north. Adjoining it was the village of Johnstown, with court-house and Episcopal church, which soon attracted settlers. Soon after coming to America Johnson had married Catharine Wisenburg, a German girl, who died young, leaving a son, John, knighted in 1765, and two daughters. He is said also to have had many mistresses, both Indian and white. The most noted of these was Molly Brant, the sister of Thayendanegea or Joseph Brant (*q. v.*). Though never legally married she lived at his house till his death, and bore him eight children, for whom he made provision in his will. He died at Johnstown, N. Y., July 11, 1774. He was buried in a vault of the church there, and in 1862 his remains were discovered and reinterred. See his *Life*, by W. L. Stone (1865).

His eldest son, Sir John Johnson (1742–1830), succeeded to his father's office and title in 1774, and was then appointed a major-general in the British service. When American independence was declared he remained loyal to the crown, and went to Canada with many followers. From these he organized two battalions called the Royal Greens, and in 1777 invested Fort Stanwix. He defeated Gen. Herkimer, who was hastening to its rescue, but was himself defeated in October, 1780. His estates had been sequestrated by the colonial legislature, and in consequence he incited the Indians to many deeds of revenge on border settlements. After the war the British government gave him large tracts of land in Canada. He was also made a member of the colonial council, and was superintendent of Indian affairs until his death at Montreal, Jan. 4, 1830.

JOHNSON, William Samuel (1727–1819), an American statesman, was born at Stratford, Conn., Oct. 7, 1727, being the elder son of Rev. Dr. Samuel Johnson. He graduated at Yale College in 1744, studied law and early became distinguished by his eloquence and ability. He was elected to the legislature in 1761, and was a delegate to the Congress at New York in 1765. He drew up the petitions and remonstrances that were sent to England in regard to the stamp-act. From 1766 to 1771 he was agent in England for the colony of Connecticut, and while there received the dergee of D. C. L. from Oxford University. In 1772 he was appointed a judge of the Superior Court of the colony and held this position until 1774. He took no part in the war for independence, but after its close was a delegate to Congress. In 1787 he was a member of the convention to frame the Federal Constitution, and was the first to propose the organization of a Senate. He was chosen U. S. Senator in 1789, and with his colleague, Oliver Ellsworth, drew up the bill establishing the judiciary system of the United States. When King's College, New York, was reorganized in 1787 as Columbia College. Dr. Johnson was invited to the presidency, which his father had held at its inception. He discharged the duties of this position until 1800, when he retired to Stratford, where he died, Nov. 14, 1819.

JOHNSTON, Alexander, an American author, was born at Brooklyn, N. Y., April 29, 1849. He graduated at Rutgers College in 1870, studied law and was admitted to the New Jersey bar in 1876. After conducting a school at Norwalk, Conn., he was chosen professor of jurisprudence and political economy in the College of New Jersey, Princeton, in 1883. He has published *History of American Politics* (1879); *Genesis of a New England State: Connecticut* (1883); *Representative American Speeches* (1885); *History of the United States* (1885); and has contributed to various works.

JOHNSTON, Joseph Eccleston, an American general, was born in Prince Edward co., Va., in February, 1807. He graduated at West Point in 1829, and entered the artillery service. He served in the war against the Seminole Indians, gaining the brevet of captain. In 1838 he was made lieutenant of topographical engineers, and was employed on river and harbor improvements and boundary surveys until the Mexican war. He was engaged as engineer at the siege of Vera Cruz, but in April, 1847, was made lieutenant-colonel of voltigeurs, and was wounded at Cerro Gordo. He was distinguished at Chapultepec and in the final assault on Mexico, where he was again wounded. In 1848 he returned to the topographical engineers as captain and brevet lieutenant-colonel. In 1855 he became lieutenant-colonel of cavalry, and he served in the Utah expedition of 1857. He was appointed quartermaster-general, with the rank of brigadier-general, in June, 1860, but resigned in April, 1861, when the Virginia State Convention passed the ordinance of secession. He was immediately appointed major-general in the Confederate army. He occupied Harper's Ferry in May, and afterwards held in check the army of Gen. Robert Patterson. At the battle of Bull Run he reinforced Gen. Beauregard, waiving his right to command the united forces. He had command of the Confederate army around Richmond at the time of Gen. McClellan's advance, and at the close of the battle of Fair Oaks, May 31, 1862, was severely wounded. When he returned to service in November he was assigned to the department of Tennessee and Mississippi, with the rank of lieutenant-general. During the siege of Vicksburg he made efforts to relieve that place, but was finally defeated and driven beyond Jackson, Miss. In December, 1863, being then general, he succeeded Gen. Bragg in command of the Army of the Tennessee, and during the following spring he was steadily driven back by the advance of Gen. W. T. Sherman on Atlanta. During the siege of that city he was superseded by Gen. J. B. Hood, July 17, 1864, but in January following he was restored to command in South Carolina. He was unable to check Gen. Sherman's march, and suffered a defeat at Bentonville, N. C., March 19, 1865. On receiving intelligence of Gen. Lee's surrender he entered into negotiations with Gen. Sherman, which led to the surrender of his army at Durham, N. C., April 26, 1865. The terms of the pacification then made were afterwards rejected at Washington. After the war Johnston took up his residence in Savannah, Ga., and devoted himself diligently to the development of Southern resources. He published a *Narrative of Military Operations* (1874). Later, he removed to New York.

JOHNSTOWN, a village of New York, county-seat of Fulton county, is on Cayadutta creek, 48 miles W. N. W. of Albany, and 6 miles S. of Gloversville. It is on the Fonda, Johnstown, and Gloversville Railroad, which connects at Fonda, 4 miles distant, with the New York Central Railroad. Besides the county buildings it has 9 churches, a union school banks, gas-works, grist- and lumber-mills, 3 newspapers, and extensive manufactories of gloves and mittens. The surrounding region is hilly and generally fertile. The population of the village in 1870 was 3282; in 1880, 5013.

JOINTURE. A law term signifying a joint-estate limited to both husband and wife. In its more usual sense it is defined as follows: "A competent livelihood of freehold for the wife, of lands and tenements, to take effect, in profit or possession, presently after the death of the husband, for the life of the wife at least." Previous to the statute of *uses*, 27 Henry VIII., c. 10, lands were generally held throughout England in trust to the *use* of the virtual owner. In such estates the wife of the *cestui que use* was not entitled to dower, the husband not being *seized* or legally *possessed* of the same. Therefore jointures were created in order to insure to the wife a "competent livelihood" after the death of her husband. Although the statute of uses *executed* the use, or merged the legal and equitable estates in the *cestui que use*, it did not make her dowable of all her husband's lands in addition to what had been settled on her in jointure, but expressly provided that when a wife took an estate in jointure before marriage she should be forever precluded from the dower; but to bar the dower the following requisites must have been observed: 1. The jointure must take effect immediately upon the death of the husband. 2. It must be for her own life at least, and not *pur auter vie*, or for any term of years, or other smaller estate. 3. It must be made to herself, and no other in trust for her. 4. It must be made, and so in the deed expressed, to be in full satisfaction of her dower. It was further provided that if the jointure were made after marriage the wife might elect, on the death of the husband, to take it or not, in lieu of dower. The above statute has been extensively adopted throughout the United States, and forms the basis of many decisions in regard to dower. (See Husband and Wife.)

JOINVILLE, François Ferdinand Philippe Louis Marie d' Orléans, Prince de, a French soldier and author, was born at Neuilly, Oct. 14, 1818, being the third son of King Louis Philippe. He entered the navy at the age of thirteen, and in 1836 became a lieutenant. In 1838 he served at the attack on Vera Cruz, and in 1840 he commanded the frigate in which the remains of Napoleon were brought from St. Helena to France. In 1843 he married the Princess Francesca di Braganza, daughter of Dom Pedro I., Emperor of Brazil. Being made rear-admiral, in 1844 he commanded the fleet which bombarded Tangiers. When his father was driven from his throne in 1848 Prince Joinville held command of the fleet off Algiers, and his brother, Duc D'Aumale, commanded the French army in Africa. The two brothers, submitting to the will of the people, relinquished their commands and sailed for Gibraltar, and thence to England, where the family gathered at Claremont. Prince Joinville then devoted himself to travel and study. In 1861 he came to America in company with his nephews, the Comte de Paris and the Duc de Chartres. The prince accompanied Gen. McClellan during his command of the Army of the Potomac, while his nephews held positions on the general's staff. On his return to France De Joinville published an account of the campaign. In 1870 the prince offered his services in a military capacity to the emperor, but they were declined by him and by the government of defence. In February, 1871, he was elected as a delegate to the National Assembly, and in June, by the abrogation of the laws of exile, the election was rendered valid. In 1876 he declined to be a candidate, and he has since lived in retirement. He has published many articles in the *Revue des Deux Mondes*, some of which have been issued separately. His principal publications are *Études sur la Marine* (1859; 2d ed., 1870); *L'Angleterre; La Campagne du Potomac* (1862; new ed., 1872).

His son, Pierre Philippe Jean Marie, Duc de Penthièvre, born at Saint Cloud, Nov. 4, 1845, was educated at the U. S. naval academy, and afterward served in the Portuguese navy. In 1871 he was permitted to enter the French navy as a lieutenant.

JOLIET, a city of Illinois, is the county-seat of Will county, situated upon the Des Plaines River, 35 miles S. W. of Chicago. Laid out as a village in 1834, it was incorporated as the city of Joliet, 1857. It was settled by New England people and Germans principally. The city is growing rapidly, caused mainly from its excellent water-power (now fed by Lake Michigan by means of the enlarged canal), its coal-fields, stone-quarries, and factories. It has the State penitentiary, a new court-house which cost $200,000, Bessemer steel-rail mills, 9 wire-mills, grain-elevators, tile-works, paper- and flour-mills, stove- and merchant-foundries, farm-implement factories, etc. Its lines of communication are the Illinois and Michigan Canal, the Chicago, Rock Island, and Pacific Railroad, the Chicago and Alton, the Michigan Central, the Chicago, Pekin, and South-western, the Chicago and St. Louis, and the Joliet and Aurora Railroads. It has 21 churches, 7 public-school buildings, 6 denominational school buildings, 2 national banks and 3 private, 3 daily and 6 weekly newspapers, water-works, gas, electric lights, police- and fire-alarm telegraph lines, telephone exchange. Total valuation of property about $7,000,000. Population in 1880, 11,657.

JONAH. See Prophets.

JONES, Anson (1798–1858), president of the Republic of Texas, was born at Great Barrington, Mass., Jan. 20, 1798. He studied medicine at Litchfield, Conn., and commenced practice in 1820, and afterwards went to South America. He also resided for a time at Philadelphia and New Orleans, but in 1833 settled at Brazoria, Texas. In the war between Texas and Mexico he was a surgeon in the Texan army, and in 1837 was elected to the Texan Congress. In 1838 he was sent to Washington to promote the scheme of annexation to the United States. After spending a year in fruitless negotiations he returned to Texas and entered the Senate. In 1841 Pres. Houston appointed him secretary of state, and in 1844 Jones was elected to the presidency, which he held until Texas was admitted to the Union. He then devoted himself to agriculture. He died by his own hand at Houston, Texas, Jan. 7, 1858. His *Journal*, with an introductory autobiography, was printed in 1859.

JONES, Charles Colcock, Jr., an American historian and antiquarian, was born at Savannah, Ga., Oct. 28, 1831. He was educated partly at South Carolina College, Columbia, his father, Rev. C. C. Jones, Sr., D. D. (1804–1863), being professor in the Presbyterian Theological Seminary in that city from 1847 to 1850. Afterwards he studied at Princeton College, graduating in 1852. He then studied law at Philadelphia and at Harvard College. Admitted to the bar at Savannah, Ga, in 1856, he soon took high rank in his profession, and was elected mayor of Savannah. In 1861 he entered the Confederate army, and rose to be lieutenant-colonel of artillery in Gen. J. E. Johnston's army. He afterwards settled in New York. He has published *Antiquities of the Southern Indians* (1873); *Lost Cities of Georgia* (1876); and other books.

JONES, Hugh Bolton, an American painter, was born at Baltimore, Oct. 30, 1848. He studied art in his native city, and has exhibited at the National Academy since 1874. He made a sketching tour in Brittany and Spain in 1877, and exhibited at the Paris Salon and the Paris International Exhibition in 1878. He was made a member of the National Academy in 1883. Among his pictures are Summer on the Blue Ridge (1874), The Poplars—Tangier, The Wayside Pool, The Parable of the Sower, The Ferry Inn (at the Centennial Exhibition), Return of the Cows (at the Paris Exhibition, 1878).

JORDAN, David Starr, an American naturalist, was born at Gainesville, N. Y., Jan. 19, 1851. He graduated at Cornell University in 1872, and in 1875 obtained the degree of M. D. from Indiana University, and became professor of biology at Butler University, Indianapolis. In 1879 he was called to a similar position in Indiana University. He was also special agent of the U. S. Census Bureau, investigating marine industries of the Pacific coast from 1879 to 1881. He has published a *Manual of Vertebrates* (1876–81); *Synopsis of Fishes of North America* (1883); and many scientific papers, chiefly on fishes.

JORDAN, Thomas, an American general, was born at Luray, Va., Sept. 30, 1819. He graduated at West Point and entered the infantry service in 1840. During the Seminole war in 1842 he captured their chief, Tiger Tail. In the Mexican war he served under Gen. Taylor, and was made captain and quartermaster, March 3, 1847. He served for several years on the Pacific coast, but on the outbreak of the civil war entered the Confederate army. He was adjutant-general under Gen. Beauregard at Bull Run, and afterwards accompanied him as chief-of-staff to Tennessee. He was at the battle of Shiloh, and was promoted brigadier-general. After serving on the staff of Gen. Bragg he rejoined Beauregard during the defence of Charleston, 1863–64. At the close of the war he published in *Harper's Magazine* a review of the Confederate administration. He was afterwards editor of the *Memphis Appeal*. In 1869 he was made chief-of-staff to the revolutionary army in Cuba, and in December succeeded to the chief command. Finding himself unable to organize and equip an effective force, he resigned in February, 1870, and returned to the United States. He has since been engaged in literary pursuits. He has published *Campaigns of Gen. N. B. Forrest* (1867) and other works.

JOULE, James Prescott, an English physicist, was born at Salford, Dec. 24, 1818. His father was a brewer, and he himself was engaged in the same business. Instructed in science by Dr. John Dalton, he early showed fondness for chemical experiments, and constructed an electro-magnetic engine in 1838. His researches led to the discovery of the laws of the evolution of heat by magnetic currents, and of the fact that mechanical power can be converted into heat. Joule then proceeded to determine the mechanical equivalent of heat. The final result of his experiments, as stated in 1878, is, that to raise one cubic foot of water 1° Fahr. in temperature requires the same force as to raise 772 pounds one foot in height. In 1843 he presented to the British Association the result of his researches up to that time. With Sir William Thomson, of Glasgow, he prosecuted researches on the thermal effects of fluids in motion, which were published by the Royal Society between 1853 and 1862. Another series of investigations, conducted by Joule in concert with Dr. Lyon Playfair, had relation to the varying volume of space occupied by the same body in a solid and in a liquid state. His discoveries are intimately connected with the doctrine of the correlation of forces and the kinetic theory of gases. Their importance procured for him, from the Universities of Dublin and Edinburgh, the degree of LL. D. in 1857 and 1871, and from the University of Oxford the degree of D. C. L. in 1866. He has also received many marks of honor from foreign societies, and in 1878 a civil list pension of £200. In the course of his researches he has made many inventions and improvements in scientific processes and apparatus.

JOURNALISM is the art of making the newspaper. Successful journalism implies the prosecution of the art strictly as a commercial enterprise. The newspaper is an outgrowth of man's common human interest in his fellows, and its development forms one of the most interesting chapters in the social history of the nineteenth century. Unlike some arts or professions, journalism cannot be learned theoretically. There are no text-books and any college of journalism must prove a delusion. A thoroughly equipped newspaper office is the only school. There is only one teacher—experience. At present, a man must qualify himself for the full responsibilities of journalism by mastering the systematic organization that renders possible the daily production of such a specimen of complicated mechanical and intellectual work as the newspaper.

The newspaper is the product of skilled labor quite as much as the cloth of commerce. In no branch of trade is labor more nicely divided or is system so much relied upon for successful results. In the making of a shoe several different parts are fashioned by as many workmen, but after the earlier stages are passed each laborer handles the entire article as it advances toward completion. To the production of the daily newspaper, however, as many as one hundred or more different intelligences contribute. They may be located in widely separated parts of the world; each has a niche to fill, and when every separate part is fitted into place, at the hour of going to press, the completed structure must not contain a single repetition or contradiction. To this result two distinct orders of intellect contribute. They may be popularly defined as the commercial and the literary "senses." From these naturally develop two co-ordinate branches, distinct though inseparable. One is called the editorial department, the other the publication department. To illustrate their interdependence it is only necessary to suggest that the most successful and enterprising search for news will totally miscarry if the compositors strike or the presses break down at a critical hour of the night. It is a fundamental principle in journalism that the writer and the editor are as dependent on the paper-maker, the compositor, the pressman, and the news-agent as the latter are on the former.

The journalism of to-day has developed with literary taste. It dates back hardly half a century, when the first commercial rating was given to information desirable for publication. Such information is called news. It is now bought, sold, copyrighted, and traded in like stocks or provisions. When the newspaper began buying and paying for its news, as it before had been doing for white paper, that act developed the new and golden idea: News, to be secured and published, must be sought for, found, and handled with great promptness, like other precious and perishable wares of the world's commerce. Such is the foundation stone upon which journalism, if it ever become established as an exact art, must rest. News is, indeed, the most perishable commodity handled by man. Information that is news, if properly handled, may command thousands of dollars to-day but be utterly without value to-morrow. Naturally the quest for news has grown very keen, and competition constantly acts as an incentive to innovations in the art of capturing and printing it.

The search for news developed the reporter and the special correspondent—the bone and sinew of the daily journal. The correspondent has been called "the knight-errant of the newspaper." The greed for news developed with what it fed on. At first the finding of news was regarded as more important than the manner of its preparation or its presentation in type—just as the procurement of food is of more vital moment to a starving community than the manner in which it is cooked. To many commentators on and historians of the newspaper era the existence of such taste has appeared to indicate a period of retrogression. The true explanation probably is that the demand for the newspaper outgrew the methods of its preparation. Curiosity developed more rapidly than nicety of literary taste, and the latter was sacrificed to the former. During that period, naturally, writers were numerous. Executive heads of newspapers boasted that they could hire all the writers they wanted. They exalted executive talent. The managing editor made for himself a halo, and surrounded his office with mysterious pomp and circumstance. A great rivalry arose between different journals as to which should print the most columns of reading matter, without great regard to its quality. Later on, the competitive struggle turned to the advertising columns, and some proprietors strove to outdo their contemporaries in that direction, without reference to the rates obtained. Gradually the readers of newspapers grew more exacting. Not any the less did they demand all the news of the world, but they insisted that it must be served to them in more concise and attractive shape. Charles A. Dana was the first to foster this growing taste. He made a bold departure from what may be dubbed the grocer's-bill style of writing—plain, matter-of-fact statement, without literary art or descriptive embellishment—and introduced into the newspaper the graphic, narrative form that has held its popularity for a decade. There was nothing remarkable in the change, for it grew out of the adoption of a medium ground between the curt and the Alexandrine schools. On the other hand, some editors pitched their prose in far too high a key, and, going to that extreme, wrote so far above the ideas and vocabularies of their constituency that the papers could not be given away. "Fine writing" never has and probably never will establish a newspaper. Success in journalism depends upon the directing mind; after that, upon the locality in which the enterprise is undertaken.

In this country, the most independent newspapers have attained the largest measure of success. The party organ will probably exist for another generation, but its power has passed to the journal that is free to speak its mind and to chronicle impartially the events of the day. There was much said about the "power of the press" in former days. Horace Greeley was the last man of ability who believed in it. More recent opinion is that the best journalism aspires to no power beyond that exercised by a fearless and unbiased presentation of the truth about all public measures and men in public life. A vindictive editor is a sad spectacle. Journalism abhors him.

We now approach a closer consideration of the *personnel* of the newspaper. The so-called "editorial" or literary branch is undoubtedly the originating one. In it, somewhere, the daily career of the newspaper begins. There we find the editor-in-chief, who directs the political policy of the journal. On many of the best newspapers he unites with his duties those of managing or chief executive editor. His staff includes all sub-editors, all special correspondents, paragraph writers, book, art, and theatrical reviewers, and other essayists. The next position in the line below the managing editor is that of the city editor. This post has increased in importance very much in the past fifteen years, and it should be filled by a man of keen judgment, prompt decision, wide experience, and unusual energy. His staff includes the reporters. Their value has grown with the city editor's advancement, and many indications point to his further improved status. The reporter is the coming man on the American newspaper. The student of American journalism must begin as a reporter. There we shall start and follow his education and development.

The reporter of this era is generally a college-bred man. Education is a pre-requisite to success, though there are exceptional cases in which brilliant results have been attained with comparatively small educational capital. Genius may, but rarely does, supply the place of acquired knowledge. The first thing to be learned is patience. Most beginners want to start as "leader writers" or critics of other people's work. It is a curious fact that, while young men are satisfied to enter law offices and wait several years before an income is reached, those who enter journalism expect it to support them from the start; and if they have reasonable ability, adequate education, and favoring fortune, it will do so. The reporter begins without a salary, and is paid for what he writes. He should, above all, learn to write his language in a graceful and flowing style. The acquirement of that art alone is a work of years. Side by side with his gradual improvement in that direction he should develop his faculties of observation and his memory. It is written of Balzac (who possessed some of the best elements of the ideal reporter) that he cultivated observation by writing down long catalogues of articles that he had seen as he hurriedly walked past the show-windows on the Parisian boulevards. When his list was completed, he would return to the window and ascertain the proportionate number of articles that he had failed to include in his grasping glance. The managing editor of a New York journal once gave to a young reporter the following rather Oriental instructions: "Take a walk up Broadway; something will happen that never happened before; bring it back with you." It is the faculty of seeing what other people overlook, or of describing what everybody beholds but very few comprehend, that makes the successful reporter. In that path the student of journalism should spend two or three years. He will there learn how to gather news and how to treat it when in his possession. His experience will begin with reports of small and unimportant meetings, but as he advances the class of work assigned him by the city editor will gradually rise to a higher plane. At the end of six months he probably will be given his first "special article." This class of work may be historical or descriptive. An old landmark may be about to give place to a new structure, and a bright, readable history of the condemned building, with all its associations and anecdotes, will make timely reading. By slow and laborious steps the learner will win the confidence of his immediate superior, the city editor, and ultimately will be intrusted with the most important work. If a comparative estimate be desired as to the value of the essay writer or the working journalist, it may be formed by placing the two classes of men side by side in a great crisis. Imagine, for example, the murder at midnight of a distinguished citizen—a crime that will be the universal theme of conversation on the following day. The rivalry between the morning journals as to which shall have the most complete account is fierce to a degree unknown in other branches of business. Only two hours remain before going to press in which to gather the information, to commit it to paper, to put it in type, to read it in proof, to "make up" the forms, to stereotype the pages, and to fasten the plates on the perfecting presses. Who is the hero of the hour? The man who will save the night is he who can jump into a cab, drive straight to the right sources of information, visit the scene of the crime, talk with the murderer, describe him, and, above all else, return in time to get the results of his work into the paper. It is one thing to get news, another to get it printed. Every man who goes on such a mission—and dozens are sent nearly every night in the large cities of this country—takes his own future in his keeping. He is, besides, intrusted with the prestige of the journal he serves. Failure will be followed by inexorable punishment. Discharge is certain; disgrace among his fellow-workmen inevitable and lasting. The stain that attaches to him because he has allowed his paper to be "beaten" on an important bit of news never can be washed out. Those who have not comprehended what news is will fail to understand why this is so. They forget its perishable characteristics. It is the loss of something that never can be regained that constitutes the gravamen of the offence. With the loss of an important piece of news must follow public and wide-spread recognition of inferiority. Failure to have such matter is represented by a computable sum of money (as is shown in a prompt decline of circulation), an unknown loss of prestige, and ultimately results in a shrinkage of advertising patronage. Every one of the thousands of readers becomes a censor, and from their verdict there is no appeal. A few years ago such a mischance cost a New York journal 20,000 copies of its circulation in one week—a loss that never was regained under the same management. The newspaper reader who vainly looks in his favorite journal for what should be but is not there, and finds what he seeks in a rival publication, is dangerously liable to forsake the companion of years for the newly-found friend. Therefore, the man who is defeated in a chase for news loses that which never can be restored. Every inch lost is just so much ground to be won back before advancement can recommence. It is a cruel but a just law, that for the man who fails in journalism there should be no atonement. Pride prevents an explanation in the columns of the journal itself as to the causes leading to its humiliation. It is an impossibility for the editor or proprietor to take each of the paper's 5000 or 50,000 readers by the arm to explain to him or her privately. To the learner of this art, therefore, the importance of bringing back what he is sent to get will early become patent. The responsibility for the reporter's success rests undividedly on the shoulders of the city editor, who must meet the scornful assaults of editor or publisher because of the failure of his subordinate; but his revenge will fall upon the head of the offender.

The sub-editors are recruited from the ranks of the reporters. They should be men of education and experience. Too often they are mere destroyers, without any redeeming traits of originality. At their head is the night editor (we are now considering the *personnel* of the morning journal). He puts the paper to press. Though his superior, nominally, the city editor is liable to have all his plans for the next day's leading feature destroyed by this autocrat, who decides in what part of the paper the important matter shall go. Subject only to the rules of the composing-room, he can decree in what type it shall be set and how much "display" shall be given it. Rarely does it occur that a night editor makes a suggestion. He deals with results, and generally acts on the assumption that he is not paid to originate plans for capturing news or for ideas. While on duty he is almost universally unpopular, because in every large newspaper office nearly twice as much matter as can be printed is collected daily, and somebody's feelings have to suffer cruelly every morning. Between the city editor and the night editor a condition of armed resistance generally exists. With the city editor struggling to secure as much space as possible for local news; with the telegraph editor urging the claims of the Washington despatches; with the foreign editor dwelling on the gravity of the relations between Greece and Turkey and insisting on a map or a column of historical resumé, the night editor's life is not a happy one.

In connection with this office, the process of laying out the paper of the following day may be briefly indicated. Different plans are followed in various offices. Where the paper is a small one of only 4 pages, the night editor generally performs the process mentally. He carries in his mind a picture of each page, and "makes up" as he goes along. But where the journal grows to 8, 10, 12, or 24 pages, he is compelled to construct a miniature folio in which, page by page, he apportions the reading matter as distinct from advertisements. To his assistance comes the foreman of the composing-room. At precisely 9 P. M. he touches the foreman's bell. That man has "cast up," or estimated, all the advertisements already in type or to be given out to the compositors. No more paid announcements of any kind, we shall assume, are to be received after that hour. The foreman, for instance, reports: "I have 40 columns of advertisements." The night editor, knowing that there are 6 columns to a page, hastily casts up the probable size of his paper thus:—

Advertisements	40	Domestic telegrams	8
Editorials	3½	Ship news	4
Foreign	4	Commercial	5
Washington	3	City news	12
State capital	2½	Emergency	2
Total columns			84

This rough estimate shows a 14-page paper, but, practically, that is an impossible size—"a triple sheet, with a supplement." Therefore, he must do one of two things, He must reduce the matter by 12 columns, to the size of a 12-page paper; or allow it to expand into a "quadruple" of 16 pages. He goes over his estimate again, sends for the city editor, the Washington editor, and probably telegraphs by direct wire to the State capital to learn if a feature announced for that night cannot be held over. When he has all these returns, he knows what to do. Suppose it be to compress the paper into 12 pages. A general alarm is sounded throughout the entire establishment. All the "copy" already edited, or sent to the compositors but not put in type, is recalled and subjected to the most rigid scrutiny. The important matters are "boiled down" into paragraphs and grouped together under one heading. Considerable matter is bodily thrown away. Telegrams that may have cost much trouble and money to secure are treated according to their internal value, and just as if the matter had been gathered by the youngest reporter. While this wide-spread sacrifice is going on in every branch of the paper, the night editor recasts his table. The advertisements remain unaltered. Type is made of metal, and will not compress; nor can it be condensed like manuscript. Articles, however, can be and are cut down in the proofs. The editorial space is restricted to 3 columns; on the foreign department, a column is saved; a half-column is lopped off the Washington space; the State capital correspondent has answered that his 2-column article will "keep" another day—leaving only half a column of space for him; the fire in Charleston, for instance, proves to be greatly exaggerated; the Chicago crop of homicides is meagre, and the night editor with surgical dexterity amputates 3¼ columns from the 8 allotted to the domestic telegrams; shipping and financial news (being features of the paper) cannot be tampered with. Two columns are boldly ravished from the city department; the "emergency" space is deducted; and, adding up the salvage, the wrecking master finds that he has saved 11¼ of the 12 columns of space he needed. Of course he understands that before 2 A. M. he will still have 3 or 4 columns of matter too much; but he is now comparatively easy in his mind. "Keep down the copy," "Don't let the Washington get the better of you," or "Boston must be sacrificed for Philadelphia to-night"—are a few of the commands or suggestions that go out by speaking-tube, telephone, or direct from the night editor's lips as he moves about among the shambles where the butchery of copy is going forward.

Recurring now to the miniature folio, or the "making-up schedule," which he has before him, the night editor numbers each page and marks it thus:

1. Advts.; 2. Advts.; 3. Washington, Albany, Chicago; 4. Advts.; 5. Advts. 2 cols., City news 4 cols.; 6. Editorial 3 cols., theatrical, Washington gossip, and army and navy; 7. Foreign, obituaries, advts. 2½ cols.; 8. City news, Philadelphia despatch, advts. 2 cols.; 9. Financial and commercial, advts. 1 col.; 10. Ship news 3½ cols., advts. 2½ cols.; 11. Advts.; 12. Advts.

When this schedule is completed (far fuller in detail than indicated above) the night editor sees his way clear.

But let us suppose that the decision had been in favor of the "quadruple." Space would have been plenty; the night editor would have been genial and liberal; the city editor would have got into the paper a pet feature that has been standing in proof for weeks; the foreign editor might have carried his point to the extent of showing in half a column how Greece could throw off the hated Moslem yoke, and everybody would have gone home happy in the morning. The sub-editors, reporters, and correspondents would all agree that the issue was a perfect paper. The proprietor, or the publisher, would disagree promptly. With an eye to the business end of the newspaper, he would figure thus:

To 24 extra cols. composition @ $4	$96.00
To 100,000 half sheets, 16 to the pound, @ 4½ cts. per pound	272.25
Ink, wastage, extra gas and extra wrapping paper (itemized)	28.75
Cost of happiness of editors	$397.00

In other words, it costs about $400 to increase the size of such a paper, and when it can be avoided, or is not justified by sufficient additional advertisements, it represents a loss of just so much money. Therefore, it sometimes becomes wise policy for the night editor to leave out a column or more of advertisements paid for in advance, rather than enlarge his paper by so many more columns in order to accommodate them. He had better return $100 than incur an outlay of $300 or $400 to earn it. Beyond certain reasonable limits, it is never wise policy to sacrifice news space for advertisements. The true theory is that the size of the journal should be increased.

The first out-of-town "assignment" given the reporter raises him to the grade of a special correspondent. The methods in this grade have undergone radical changes during recent years. The electric telegraph has completely supplanted the mail. Like the reporter, his first duty is to get the news he is sent in quest of. In 1871 the *New York Tribune* laid down a dictum that among newspaper men has received universal commendation. It was uttered anent the premature publication (from the point of view of the U. S. Senate) of the Treaty of Washington—one of the greatest "beats" known in the history of American journalism. "It is the duty of the Senate to keep its secrets," said the *Tribune*; "it is the duty of our correspondents to get us the news."

The first essay as a special correspondent will probably be made at the scene of some serious disaster. There his reporter's training will stand the rising student thoroughly in hand. The object of his mission is clearly before him. He gathers his facts as he would at home, and merely hands his account to a telegraph operator—page by page, it may be, if he have attained sufficient skill in rapid writing—instead of to the copy reader or city editor. Many such a chase of "hunt the writer" have telegraphist and special correspondent led each other in this country.

The next step, after 5 or 6 years' experience, will likely as not be to the State capital. Here the student of the art of making the newspaper begins the study of State politics. Another great idea dawns upon him. He is not instructed as to what to hunt. No wrecked vessel lies in the sand; no murdered victim at the morgue. The real search for news has begun! He must scent it in the corridors, committee rooms, and lobbies of the capitol. It is a great step forward. His responsibilities have increased at a bound. He no longer has a buffer between him and the executive vengeance in the form of a city editor. He confronts the limitless fountains of news, but hears the rumbling thunder at his back. He realizes that the people of the United States are a nation of politicians; that politics is the most valuable and interesting kind of news matter. He must learn the news sources, hunt out the party rallying-places, establish his relations with the State governor, chairmen of committees, and, not by any means lastly, with the officers of the capitol building.

If successful in this field for a few sessions, the learner in journalism is given a broader range. He is sent to Washington. This is the political news-centre of the nation. His view becomes as wide as the country. The capital interests him. Its great distances wear him out. The new members of Congress talk far too much, and the old ones not nearly enough. He encounters falsehood in all shapes, and almost daily is shocked to hear men admit that it is uttered for political reasons. Washington is a solemn place to any young man who, up to that time, has believed in the sincerity of humankind.

The next change of base may be to the theatre of a great war in Europe. This is regarded as the crowning compliment. Nearly all the larger American newspapers have bureaus in London and Paris. At one or other of these points the news of the Continent is gathered up, digested, and cabled to America. The five hours' difference of time in favor of this country enables alert correspondents, who do not mind keeping awake until 3 or 4 A. M., to send the cream of the news in the London morning journals. This has been done for years. This difference of longitude once enabled the New York *Herald* to print, in its city edition, the result of the Oxford and Cambridge boat race, rowed from Putney to Mortlake, on the Thames, about 8 A. M. It would be very interesting at this point to compare the methods of English, French, and American correspondents. Their ways are quite dissimilar, but something could be learned from each. A much discussed question is the value to a correspondent of an adequate acquaintance with the language of a country. All the knowledge that a journalist may possess is likely to be useful, but speaking the language of a foreign country is not nearly so valuable as a thorough experience of men. James Gordon Bennett, Jr., once wisely said on this very subject:—"For a difficult and discreet foreign mission, I'd rather have one man with five or six years of the exacting experience in my own office, than a score of polyglots who do not know news when they encounter it."

The much-discussed "interview" should naturally find consideration in this sketch. Many criticisms of its value are unfounded. The dialogue form of conveying information is as old as Zeno or Socrates, and the later of the Sacred Books of the East are filled with it (Vide, the *Vishnu Puranas*, notably, Bk. I., ch. xv.; Bk. II., ch. vii.) The interview should present a picture of the man, his manners, his dress, and his surroundings, as well as his opinions. When it is properly done it is the highest work of the art; when it is slovenly or untruthfully written it is infamous.

The managing editor is the main-spring of the newspaper. Its success or failure depend on him almost wholly, though there have been instances in which the overshadowing personality of the editor-in-chief has borne a badly-managed journal to moderate prosperity. The managing editor selects the working force of the establishment. He watches the development of events throughout the world. A deadlock in the U. S. Senate, a cabinet crisis in Spain, an intrigue to change the reigning dynasty in Turkey, Nihilist plots in Russia, an investigation of political corruption at the State capital, the last hours of a distinguished statesman in an Eastern commonwealth, and an extensive and rapidly spreading strike on the South-western railroads, must all be carefully watched. Arrangements must be made in advance for "covering" any crisis that may arise. The managing editor generally presides at the council of editors, in offices where such meetings are held. This editorial council discusses the line of policy to be followed by the journal on public questions. Originally the meetings were held in the afternoon; but it was soon discovered that the complexion of events changes so radically between 6 and 12 P. M. that the editorial councils generally assemble now in the evening. It is a maxim of the art that "news does not come to a head until midnight." In many offices the council has been abolished. In "party organs" it is useless, because the policy of the party, right or wrong, is that of the journal.

This closes our view of the executive heads of the daily newspaper. The work of the sub-editors is purely mechanical. The editorial writers are a mere tradition in the journal of to-day. Many evidences indicate that "the editorial page" is waning. The much discussed question of anonymity—its desirability from the standpoint of the writer, and its undesirability from the point of view of the publisher—is one that must find settlement in the near future. If the right be accorded the writer to sign his articles they are likely to be better. His legal responsibilities will be greatly increased and he will be more careful. The libel law (which the budding journalist must study early in his career) will be simplified. Capable work will secure better remuneration, and inferior ability less than formerly. The proprietor opposes the signature as tending to render the workman more independent of and dictatorial to his employer. This may or may not be so. Considerable might be said on both sides of this question.

This extended system of subdivided labor need not embarrass the intelligent student of journalism, because he contemplates embarking in the more modest field of the small city daily or even the country weekly. It does not affect the system if every one of these heads of departments—special writers, sub-editors, or reporters—are united in one person. Let us bring the situation home to the editor of a thoroughly good weekly journal. He is the managing editor when he decides the attitude his paper shall take regarding the opening of a new street, the selection of a town mayor, or an impending strike in a corporation factory. He is the city editor when he sends himself to ascertain the facts in any of these matters, but becomes the reporter the moment he sets out on his quest. Then he puts on the editorial writer's alleged infallibility when he begins his comments for the second page in double-leaded brevier. Whether he is a capable exchange reader the brightness of his shears and the fragrance of the paste-cup must attest. He is next the domestic news editor when he puts into readable shape a letter from a friend, who is on his wedding journey to Niagara. Then he is foreign editor when he clips a few of the freshest and most interesting cablegrams from one of his "esteemed" city contemporaries, and attaches to them some neat and appropriate comments. The country editor is drawn all the closer to his fellow-men because the heart and soul of his journal are united in a single body. He may indulge his sympathy in the welfare of personal friends in a way that is forbidden to him that writes for an unknown public. The country paper is one of the enduring industries of the land. It is interesting, but it has only a hypothetical relation to journalism.

The commercial value of news to the management of the daily journal cannot be learned too soon. Such a knowledge gives the editor, special correspondent, or reporter a measure of *his* worth. It explains to him, in large degree, why he should suffer disgrace when he makes mistakes. It gives a clear insight into the meaning of the word news. Let us, therefore, study the reasons for phenomenal increase in circulation when some really important event has occurred. It is news that sells a paper, for however brilliant the editorial articles of a public journal there is grave doubt that any single production of the editorial pen ever sold a single extra copy of a newspaper.

A careful and extended search through the books and the files of a prominent New York morning newspaper reveals much interesting information on this very subject. The insight which is given into the capricious character of the reading public cannot be overestimated.

The natural increase in the circulation of the journal referred to, from 1870, where the research began, to 1882, where it closed, was from 85,000 to 135,000 copies daily. This showed a growth in twelve years of 50,000 copies. On the day following the Orange riot on Eighth Avenue, New York, a sudden demand arose for 192,224 papers, showing a sudden increase of 102,641 over the issue of the day before (89,582). With this single exception political news shows the greatest popularity. Take the three Presidential elections: The morning after the Grant-Greeley vote (Nov. 6, 1872), there was an increase of 64,000; on the day following the Tilden-Hayes contest (Nov. 8, 1876), 94,000 extras, and on the morning succeeding the Garfield-Hancock election (Nov. 3, 1880), 87,000 increase. Elections in the so-called October States, in Presidential years, excite curiosity enough to call out an average extra issue of 21,000; but a particularly heated local election in the metropolis is generally good for 50,000 extra copies to a journal of 100,000 circulation. And the strange feature about all these figures is that the permanent circulation of the journal is always a factor in the ratio of sudden expansion. For this there is hardly any explanation. It would seem that any great sudden demand ought to create nearly equal demand and sale for all established journals; but research shows that various papers are affected differently by different kinds of news. The inauguration of a President excites comparatively small attention, it is good for only 7000 or 10,000 extras, though the decision of the Electoral Commission in 1876 occasioned a sudden demand for 87,560 extra copies. The final result and account of the last day's tramp at a walking match increase the sales from 18,500 to 41,000 copies. The Sullivan-Ryan prize-fight of February, 1882, made a difference to the good of 11,800. Great fires are not as valuable news features as the inexperienced student of journalism would suppose. The Chicago fire (October, 1871,) showed an increase of 14,650, but the Boston conflagration, a year later, advanced the circulation of the journal only 9000 copies. It was, of course, a bonanza to such of the Boston newspapers as were not destroyed. The terrible loss of 200 lives at the Brooklyn theatre, in 1876, swelled the circulation by 13,800, but a fire in Hale's piano factory (September, 1877), at which some six unfortunate employés were burned, produced about the same increase. What were the elements of human interest in this latter disaster, that it should have precisely the same effect upon circulation produced by the incomparably greater calamity in Brooklyn? The discovery is made that the whim of the public does not depend altogether on the extent of the loss of life. Who will deny the potency of what has been called human interest? Yet, the next citation we make would appear to disprove its existence. The awful accident in the Hudson River tunnel, with all the tragically-heroic elements of Peter Woodruff's noble self sacrifice for the lives of his companions, added only 2000 copies; while an explosion in a candy-factory on College Place, in 1877, swelled the purchases by 14,300.

At this point, rather than while writing of the city editor, it is wisest to indicate the manner in which he should watch the public pulse. He cannot rely on his judgment as to how many days a news feature will last. He can study the fickle public only through the reports from the press-room. If he sees, for example, that no great avidity is shown for the details of the Brooklyn theatre fire, he cuts his space down the second day, and if the indifference continues drops the subject, as a news feature, on the third morning. This saves space, which is worth say $100 per column, for advertisements, and enables the city editor to use his reporters to the very best advantage.

It is a popular fallacy that newspapers cater to depraved tastes by publishing narratives of crime. Crime is not especially desirable news. The startling murder of Mr. Nathan, the New York banker (in 1870)—a crime invested with romance and strange curiosity even to this day—added less than 11,000 extra copies to the regular daily sales. The shooting of James Fisk, Jr. (Jan. 8, 1872), hardly 10,000; the conviction of Stokes, his slayer, a year later, 4250. The imprisonment of Tweed (Nov. 25, 1873) added 4900, and the mysterious murder of Mrs. Dr. Hull in New York (Jan. 14, 1879), about 3000. A national event, like the shooting of President Garfield, is of universal interest; but the increase of 51,600 on the morning of July 3, 1881, was not commensurate with the dreadful gravity of the occasion. The hanging of Guiteau added 75,400 to the issue. Executions at the Tombs in New York are rated at about 3500 extra. The death of A. T. Stewart, the merchant prince, did not add a single copy; the publication of his will (a by no means first-class item of news) lifted the circulation 6000, and the stealing of his body, in 1876, created a call for 42,000 "extras." The percentage of increase may be ascribed to the following causes: 1st. Presidential elections, 73 per cent.; 2d. State and municipal elections, 35 per cent.; 3d. Last days of walking matches, 20 per cent.; 4th. Elections in "October States" in Presidential years, 18 per cent.; 5th. Great fires, 9 per cent.; 6th. Notable disasters (such as wreck of the Metis, Aug. 31, 1872, increase 4000; steamship Atlantic, in 1873, 6000; explosion on ferry-boat Westfield, July, 1871, 31,000), about 9 per cent.; 7th. Great crimes (excepting Presidential assassinations), 7 per cent.; and 8th. Hangings in or near New York, 6 per cent.

After a serious contemplation of these facts, who will deny the difficulty of deciding what sort of news is most interesting to American men and women? Politics is seen to be pre-eminently the topic of value. But whence comes the 80,000 or 100,000 people, evidently not regular newspaper readers, who take up a morning journal on the day after a Presidential contest? How do they live, and where? Not reading the newspapers, how do they know that important events have just occurred?

Skill in writing attractive advertising matter is foreshadowing a new branch of the journalistic art. An advertisement, as lately understood, must make a distinct mental impression. It is valuable just to the extent that it does this. Whether it make known the tradesman individually, or the wares he offers, is one and the same thing. By reiteration or by cunning originality, the mental impression must be secured. Until that is accomplished the advertisement has failed, so far as each reader not affected is concerned. One happy idea in newspaper advertising will make a fortune for its possessor. (See ADVERTISEMENT.)

The publisher is the sturdy commercial factor in the successful newspaper enterprise. He studies the field and the way to get his papers into the proper hands at the right minute. His position differs from the manufacturer of shoes or watches. To perfect the simile we would have to imagine 100,000 people ready and willing to buy and pay for perfect watches at 5 A. M. who would not accept them as gifts at 7. The publisher takes possession of the materials from which each day's particular issue of the newspaper is to be fashioned. These reach him nowadays in the shape of stereotype plates, cast from a matrix of *papier maché* paste and plaster-of-Paris. He has already provided for the supply of white paper, ink, addressed wrappers, and machine-oil. The fires under the boilers must be in just such a condition that the engines can be started on the moment. The presses must be of the latest pattern, printing from a mile-long roll of paper, cutting, folding, gumming, and counting the complete journals as delivered. At a fixed hour and minute the first complete set of plates must be on the cylinders and the press must start. Then the race for the early mails begins. The Southern first, the Western next, the Eastern third, and the Northern last, "after that the deluge"—the city edition.

Outside the publisher's office stands the newsman. After all the cost of labor, money, and experience, the wares are not marketed! The goods are produced but not sold. The public will not seek the printing-office to purchase. Its convenience, as well as tastes, must be recognized. The public is capricious and uncertain to the last. To reach the purchaser, the U. S. mail, fast special trains, and the newsdealer are summoned. But he who saves the morning (as the correspondent in Paris or the reporter in New York have saved the night) is the newsboy. He works while others sleep; he takes hold of the newspaper at the point where the editor and publisher let go. Who dares to say that he does not belong to journalism? (J. C.)

JOWETT, BENJAMIN, an English clergyman and classical scholar, was born at Camberwell in 1817. He was educated at Oxford, was elected scholar of Balliol College in 1835, and fellow in 1838. He became a tutor in 1842, and in the same year was ordained. He afterwards served as an examiner of classical schools and on the commission for examinations for the Indian civil service, writing the report of the latter (1855). He was appointed Regius professor of Greek in 1855, and master of Balliol College in 1870. In 1855 he published a *Commentary on the Epistles of St. Paul to the Thessalonians, Galatians, and Romans.* He contributed to the *Essays and Review* (1857) an article on "The Inspiration of Scripture," which not only called forth severe criticism on account of its rationalism but was the ground of an accusation of heresy, for which he was tried and acquitted in the chancellor's court of the University of Oxford. His most important work is *The Dialogues of Plato, translated into English, with Analyses and Introductions* (4 vols., 1871). Later came his translations of *Thucydides* (1883) and *Aristotle* (1886). His style is admirably clear and his scholarship unimpeachable.

JOY, CHARLES A., an American chemist, was born at Ludlowville, N. Y., Oct. 8, 1823. He graduated at Union College in 1844, and studied law at the Dane Law School of Harvard College. In 1847 he was appointed on the government survey of the Lake Superior Copper Region. He went to Europe in 1849, and studied at the Universities of Berlin and Göttingen, receiving the degree of Ph.D. from the latter in 1852. On his return, in 1853, he was made professor of chemistry in Union College, and in 1857 was called to a similar professorship in Columbia College, New York. He has contributed to many scientific periodicals.

JUDD, SYLVESTER (1813–1853), an American clergyman and author, was born at Westhampton, Mass., July 23, 1813. He was the great-grandson of Rev. Jonathan Judd, the first clergyman of Southampton, and for sixty years pastor of that congregation. Sylvester graduated at Yale College in 1836, and, after teaching for a time, studied theology in the Divinity School at Harvard. In 1840 he became pastor of the Unitarian Church at Augusta, Me. Having become a Unitarian, he aimed to set forth his ideal of Christianity not only in sermons but in works of the imagination. His most notable effort is *Margaret* (1845), a remarkable picture of New England life and scenery. He also published *Philo*, a didactic poem in blank verse (1850), and *Richard Edney and the Governor's Family* (1850), a story intended as a companion to *Margaret.* He died at Augusta, Me., Jan. 20, 1853. After his death a volume of discourses on *The Church* (1854) appeared, and his *Life* was published by Mrs. A. Hall (1855).

See Vol. XIII. p. 773 Am. ed. (p. 763 Edin. ed.).

JUDGES. The Book of Judges (perhaps including Ruth) forms, with First and Second Samuel, a complete historical work. The Books of Kings, indeed, presuppose and continue the history recorded in Judges and Samuel, but are nevertheless an entirely different literary work. See KINGS and SAMUEL. The most probable opinion is that the Book of Judges was completed within the lifetime of the prophet Nathan, and not long after the death of David. It consists of three parts, the last being the three historical stories: the story of Samson and his exploits, Jud. xiii. 2–xvi.; the story of the Danite Laish and its sanctuary, Jud. xvii. and xviii., and the story of the civil war with Benjamin, Jud. xix.–xxi. No system of dates is given in these stories, but the last two belong within the lifetime of Phinehas, the grand-son of Aaron, Jud. xx. 28; and the Philistine oppression of Samson's time is probably that defined in Jud. x. 7 as just previous to the eighteen years of the Ammonite oppression. The middle part of the book is the continuous narrative, Jud. ii. 6–xiii. i. This part is carefully dated throughout, the first 200 years being described in periods of 40 years each, but the times after that by the years of the successive judges. This middle part of the book begins by repeating, with very slight changes, the last six verses of Joshua, and then carries the history through from the times of Joshua to the times of Eli, omitting the events contained in the three stories with which the book closes. These circumstances strongly suggest the theory that this section was written after the writing of the stories and of the history of Samuel's administration, 1 Sam. iv., etc., to fill up the gap that then remained in the history. The first portion of the book, Jud. i. and ii. 1–5, is made up of prefatory matters, with citations made by the author of Judges from Joshua, or the reverse. That the history and the chronology exhibited in the Book of Judges are intelligible and credible is shown under ISRAEL.

For a discussion of the chronology of this book see the *Old Testament Student* for January, 1884; for the question of the literary form of this part of the history see the journal of the *Exegetical Society*, 1884; the work on Judges in *Pulpit Commentary* is by Lord A. C. Hervey. (W. J. B.)

JUNKIN, GEORGE (1790–1868), an American clergyman and educator, was born near New Kingston, Pa., Nov. 1, 1790. He graduated at Jefferson College in 1813, studied theology under Rev. Dr. J. M. Mason, in New York, and in 1819 became pastor of a church at Milton, Pa. He also established an academy at that place, and for two years edited a weekly religious paper. He followed Dr. Mason in uniting with the Presbyterian Church, and in 1832 was called to be first president of Lafayette College, Easton, Pa., which was then organized. In 1841 he accepted a call to the presidency of Miami University, but in 1844 returned to Lafayette College. In the controversy which resulted in the division of the Presbyterian Church in 1837 Dr. Junkin was a strenuous advocate of Old School Presbyterianism in doctrine and discipline. In 1848 he was made president of Washington College, Lexington, Va., and held this office till the commencement of the civil war, when he removed to Philadelphia, where he died, May 20, 1868. Among his works are *Treatise on Justification* (1839); *Lectures on the Prophecies* (1844); *Political Fallacies* (1862); *Treatise on Sanctification* (1864); *Two Missions, the Apostolic and the Evangelical* (1864); *The Tabernacle* (1865). His biography was published by his brother, Rev. D. X. Junkin, D. D. (1871).

JUSTE, THÉODORE, a Belgian historian, was born at Brussels, Jan. 11, 1818. On the completion of his studies he was employed in the ministry of the interior, and became secretary of the board of education. In 1859 he was made keeper of the royal museum of antiquities at Brussels, and in 1870 became professor of history in the military school. He has published many valuable works on the history of his country, among which are *Histoire de Belgique* (1838; 4th ed., 1868); *Précis de l'histoire du moyen âge* (5 vols., 1848); *La Revolution des Pays-Bas sous Philippe II.* (4 vols., 1855–63); *Histoire du Congrès national* (1861); *La Révolution belge de* 1830 (2 vols., 1862); *Guillaume le Taciturne* (1873); and *Les Fondateurs de la Monarchie belge* (1865–84).

See Vol. XIII. p. 807 Am. ed. (p. 798 Edin. ed.).

JUTE, the fibre of several species of *Corchorus*, an East Indian genus of plants, which has come very largely into use of recent years in the weaving of the coarse bagging material known as gunny cloth, and for several other purposes. So great has become the importation of this material into the United States that efforts have been made, during 15 years past, to cultivate the plant in our Southern States, and to manufacture the product at a price fairly competing with the Indian material. These efforts are now only promising success. In 1870 the department of agriculture distributed jute seed to South Carolina and the Gulf States, with the result of proving that the plant can be grown "wherever in the Southern States there is a hot, damp climate, and a moist soil of sandy clay or alluvial mould." The yield was considerably superior to that of the plant in its native soil, being from a ton to 3500 lbs. per acre, while some stalks reached the height of 15 feet. The crop in Bengal is not more than 1500 lbs. per acre, and the plant 5 to 10 feet in height. In the rice-fields of South Carolina it is said to grow luxuriantly, and throughout the Gulf States the trouble has been less in its cultivation than in the difficulty of competing with the cheap labor of India in the preparation of the fibre. Machines have recently been invented which are said to satisfactorily accomplish this, and to do more work daily with 3 persons than can be done by 160 Hindus at hand-labor. If the work of these machines proves all that is claimed for them, the cultivation of jute must become a very important industry of the South. We now pay annually $10,000,000 for imported jute and jute-goods, and the demand is increasing. The importations of unmanufactured jute, for the year ending Sept. 30, 1885, amounted to 95,292 tons, valued at $2,809,389. What are known as jute-butts, comprising the lower portion of the stem and the upper roots, which 20 years ago were considered here of no value, were in 1882 imported to a weight of 53,000 tons. The bagging for the whole cotton crop of the United States is now made from these butts, while the residue is manufactured into coarse paper stock. All the so-called manilla wrapping-paper is made from this material. Jute fibre is also used for admixture with other fibres in low-priced fabrics and in the finer carpets. It takes colors readily, but does not hold them permanently. The jute fibre imported costs from 8 to 12½ cents per lb., and the butts from 3 to 5 cents. These prices, it is claimed, can be more than met by the aid of the new machines, and fibre at the rate of a ton per acre of very superior quality can be produced at the plantation at a rate of 4 cents per lb., with comparatively small expense in culture. The net profit is estimated at about $70 per acre. It is said that jute, if planted in belts around cotton-fields, is a perfect protection against the caterpillars and other insects which infest the latter. There are several native American plants which yield a fibre which closely resembles jute in its qualities. The most important of these is *Abutilon avicennæ*, which grows freely in the Northern States, and which has been cultivated to some extent in New Jersey and Pennsylvania as a fibre plant. The wild primrose (*Œnothera biennis*) is of equal value, and these plants are credited with a superiority to jute in the usefulness of the residue of the plant as a source of paper. The machines suitable for jute preparation will be serviceable for these also, and there is reason to believe that the production of these coarse but useful fibres may soon become an important American industry and remove the necessity of importing jute.

K.

KAHNIS, Karl Friedrich August, a German theologian, was born at Greiz, Dec. 22, 1814. He was educated at Halle, became a *privat-docent* at Berlin in 1842, and was made professor-extraordinary at Breslau in 1844. Here he was active on the side of Lutheran orthodoxy, published *Lehre vom Heiligen Geist* (1847) and *Lehre vom Abendmahl* (1851), and was called to Leipsic as professor of theology in 1850. His *Lutherische Dogmatik* (1861; 2d ed., 1874) gave offence to Hengstenberg and his followers on account of its freedom, and the alienation was increased by the controversy which ensued. Among other works Kahnis has published *Christenthum und Lutherthum* (1871); *Die deutsche Reformation* (1872); *Der Gang der Kirche in Lebensbildern* (1881); *Christenthum und Philosophie* (1884).

KALAKAUA, David, king of Hawaii, or the Sandwich Islands, was born at Honolulu, Nov. 16, 1836, being the son of Kapaakea. He was educated in the royal school at Honolulu, and went to California in 1860. On the death of Lunalilo, Feb. 3, 1874, Kalakaua was elected his successor by the parliament, Feb. 12, 1874. Emma, the widow of King Kamehameha IV., had aspired to the throne, and a riot in her behalf had to be suppressed by aid from British and American vessels in the port. Kalakaua afterwards visited the United States and Europe. He is well educated, and of exemplary manners.

KALAMAZOO, a city of Michigan, county-seat of Kalamazoo county, is finely situated on a river of the same name, 144 miles E. N. E. of Chicago, and at the same distance W. of Detroit. It is at the crossing of three railways, the Michigan Central, the Grand Rapids and Indiana, and a branch of the Michigan Southern; and it is the terminus of a railroad to South Haven. Among the principal buildings are the court-house, the ladies' library, the academy of music, the children's home, and the opera-house. There are also handsome public school-houses, and the buildings of the State asylum for the insane. The city has 9 hotels, several public-halls, 4 national banks, a savings bank, 7 weekly and 2 daily newspapers, 11 churches (some of them large and handsome structures), 3 ladies' seminaries, 8 public and several private schools, etc. Kalamazoo College is an institution under Baptist control to which students of either sex are admitted. The town has excellent water-power, and its varied manufactures have contributed largely to its wealth. The manufactories are about 50 in number. Among the goods produced are machinery, paper, flour, wooden-ware, furniture, carriages, car- and wagon-springs, windmills, agricultural tools and machines, cement, sash, doors, and blinds, and a great variety of other goods. It is one of the handsomest and most thriving towns in the State. It is lighted by gas and electricity, has an effective fire department, and is supplied with water by the Holly system. The total valuation of property is about $10,000,000. There is no city debt; the public expenses for 1885 were nearly $150,000. Kalamazoo is the principal seat in the United States for the culture and distribution of celery. The celery crop of 1885-86 brought to this place some $400,000. Over 1000 acres near the town are devoted to this culture. Two crops are grown in the year, and some of the best returns show a net profit for the year of $400 per acre.

The town was first settled in 1830, and was incorporated as a city in 1884. The population of the town in 1880 was 12,012, since which time the increase has been great.

KALISCH, David (1820–1872), a German humorist, was born at Breslau, Feb. 23, 1820, of Jewish parentage. When a young man he went to Paris and became a correspondent of German newspapers, and was intimate with Heine and Proudhon. In 1846 he returned to Germany and became a contributor to the *Charivari*, published at Leipsic. He soon removed to Berlin, where in May, 1848, he founded *Kladderadatsch*, the German *Punch*. His humor also found vent in some popular plays, such as *Hunderttausend Thaler*, *Peschke*, *Berlin wie es weint und lacht*, *Einer von unsre Leut*. A collection of his works has also been made in the *Berliner Leierkasten* (1857–63). He died at Berlin, Aug. 21, 1872.

KALISCH, Marcus (1828–1885), a Jewish theologian, was born at Treptow, Prussia, May 16, 1828. He was educated at Berlin, studying both at the university and in the Rabbinical College, and taking his degree both at Berlin and Halle in 1848. Being complicated in the political troubles of that time he went to England in 1849. Here he contributed to many periodicals, lectured frequently, and was secretary to the chief rabbi. Afterwards he devoted himself to the preparation of a critical commentary on the Old Testament, being supported by the Rothschild family. The first volume appeared in 1855 under the title *A Historical and Critical Commentary on the Old Testament. Exodus.* It has been followed by *Genesis* (1858); *Leviticus* (2 vols., 1867–72). A severe illness then interrupted the work, but in 1877 he published *The Prophecies of Balaam*, and in 1880 *The Book of Jonah*. He also published a Hebrew grammar. He died Aug. 23, 1885.

KALM, Peter (1715–1779), a Swedish botanist, was born in Osterbotten, Finland, in 1715. He was educated at Upsal, and on the suggestion of Linnæus was selected by the Academy of Science at Abo, in 1745, to make a botanical tour of North America. He arrived at Philadelphia in 1748, and travelled through Pennsylvania, New York, and Canada, gathering specimens of plants. He returned to Abo in 1751 and published an account of his travels (3 vols., 1753–61), which was translated into English by J. R. Forster as *Travels in North America*. German and Dutch translations also appeared. This was the first work to give a graphic and extended account of American botany. Kalm became professor of natural history at Abo, travelled extensively in Russia, and published several botanical works. He died at Abo, Nov. 16, 1779.

KALMIA. A genus of plants belonging to the natural order *Ericaceæ*, consisting only of four species, *K. latifolia*, *K. angustifolia*, *K. glauca*, and *K. hirsuta*, confined wholly to the northern portion of the American continent. *K. latifolia* is best known. It is common on the Atlantic slope of the United States, where it is known as "calico-bush" from the tint and texture of its flowers, and "wood laurel." Sometimes the last name is confused with the "mountain laurel," a name usually given to the rhododendron. It grows from 3 to 10 or occasionally 20 feet high. The wood is very hard and frequently known as "spoon wood," having been used for that purpose by the Indians, and later by their white successors for chisel handles and similar purposes. The foliage is used for making wreaths and festoons for Christmas and other festive occasions, and when the berries of the deciduous holly —*Ilex verticillata*—are mixed with the leaves have an effect equal to the holly work of Europe. Cattle do not care to eat the leaves unless very hungry, and hence in Europe it is a popular dwarf-evergreen for planting in game preserves. In that part of the world it forms, together with the rhododendron, the leading feature in what is commonly known there as "American plants." In snowy weather, when food is scarce, sheep and horned cattle eat it and often die, but whether from indigestion, such as often follows the greed of a cow that suddenly finds itself in a clover patch, or from some poisonous element in the leaves, has not been properly determined. The popular belief is that the leaves are poisonous, but chemists have failed to find on analysis any toxic property in them. Dr. B. S. Barton remarked that "our Indians make a decoction of the leaves in order to destroy themselves." Dr. Stabler records in the *American Journal of Pharmacy* (Vol. X.) that he took a dose of powdered leaves consisting of 40 grains in two hours, without any perceptible effect, but a large dose in decoction produced vertigo and dimness of sight. Medical journals assert that the flesh of birds that feed on these leaves has been known to poison those who ate it, but this only rests on the fact that during a distemper that prevailed in Philadelphia one winter leaves of the plant were found in the craw of some birds, and the mayor of the city issued a proclamation against the use of the birds. Persons have been known since to eat the flesh of birds feeding freely on the leaves without the slightest injury in consequence. *K. angustifolia* is a smaller species, growing in drier situations than the last, and having also a poisonous reputation, probably exaggerated, with cattle-feeders. It is known as sheep-laurel, stagger bush, and lamb-kill, in reference to this reputation. *K. glauca* is a still smaller species, found in peat bogs in our northern mountains, and extending across the continent to Alaska. *K. hirsuta* is a very small species, with bristly leaves and stems, and flowers scattered in the axils of the leaves, and found, though somewhat rare, in the swamps of Virginia and the Southern States. The flowers are very interesting to the biologist. There are small pockets in the lobes of the corolla into which the anthers fit. When the flowers expand the stamens are thus strongly bent downwards. On being disturbed by an insect or some other agency the disengaged stamen springs upwards, scattering the pollen to the winds. The plant was named by Linnæus in honor of Peter Kalm (*q. v.*). Dr. Wm. Darlington has suggested that on account of the great beauty of the flowers, the fact that the genus is peculiarly American, and that it commemorates one of the first and most famous of the early botanical explorers of our country, it ought to be selected as the floral emblem of the United States. Honey from the flowers of rhododendron and kalmia has been supposed poisonous, but this is now believed to have arisen from the confusion of the modern rhododendron with that of the ancient, which was probably the oleander. There is no actual evidence that the flowers of the kalmia afford bees poisonous honey. (T. M.)

KAMEHAMEHA, the name of several kings of the Sandwich Islands. **Kamehameha I.**, also called the Great (1753–1819), was the son of Keona, a powerful chief. In 1781 he succeeded his uncle in ruling the western part of Hawaii. Obtaining help from some Europeans, he began a career of conquest which ended in 1809, making him master of the whole group. He was vigilant in guarding the chiefs whom he had conquered and liberal in rewarding those who helped him. Vancouver, the explorer, gained his friendship and induced him to make many social reforms. Among these were the abolition of human sacrifices, the partial suppression of the tabu system, and the promotion of agriculture and commerce. He died May 8, 1819.

Kamehameha II., also called Liholiho (1797–1824), son of the preceding, was born on Hawaii in 1797. He succeeded to the throne in 1819, and, though intemperate, continued the reforms begun by his father. He was greatly assisted in this by the American missionaries, who arrived in March, 1820. Desiring to obtain the support of Great Britain, he sailed with his queen for England in November, 1823, and was received with much cordiality by King George IV. and the English people. As they were preparing to return, both king and queen were attacked with measles, and Kamehameha died at London, July 14, 1824. The bodies of both were carried to Honolulu in a British vessel, arriving May 6, 1825.

Kamehameha III., also called Kauikeaouli (1814–1854), brother of the preceding, was born March 17, 1814. His predecessor not having appointed a successor Kauikeaouli was chosen by a council of chiefs, and declared king June 6, 1825, but Kaahumanu, queen-dowager of Kamehameha I., was regent until her death in 1832. He had been educated by the American missionaries, but was wild and dissipated in his youth. In 1840, acting under the advice of the missionaries, he gave his people a constitution and a simple code of laws. The independence of his government was acknowledged by the United States in 1842. British and French captains had long been struggling for power over the islands. The king at one time was compelled to cede them to a representative of Great Britain, but in 1843 they were restored on appeal. Both England and France then acknowledged the independence of his kingdom and made commercial treaties with him. In 1846 an improved administration was established, in which American missionaries held prominent places. The land which had formerly been held by the chiefs was given in fee-simple to the common people. In 1852 the king granted a liberal constitution, which greatly benefited the people. He died at Honolulu, Dec. 15, 1854.

Kamehameha IV., also called Alexander Liholiho (1834–1863), nephew and adopted son of the preceding, was born Feb. 9, 1834. He was educated by the American missionaries, and in 1850, in company with his elder brother, Lot, visited Europe. He succeeded to the throne in 1854, and about a year later married Emma, the daughter of a native chief by an English woman. Emma had been adopted by Dr. T. C. B. Rooke, an English physician, and trained in the missionary schools. The king was handsome, amiable, but rather weak in moral character. He had a son, born in 1857, and through him hoped for the perpetuation of his dynasty. But when the child died in 1862 the king's grief undermined his health. He gave much favor to the Reformed Catholic Mission, conducted by members of the Church of England, and himself translated the Book of Common Prayer into the native language. He died at Honolulu, Nov. 30, 1863.

Kamehameha V., also called Lot (1830–1872), elder brother of the preceding, was born Dec. 11, 1830. While his brother was king, he was commander-in-chief of the forces and minister of the interior. Dissipated in his youth, he afterwards reformed and devoted himself to the good of the people. Considering the constitution granted by Kamehameha III. as too democratic, he refused to take the oath to it when he became king in 1863. He called a convention to frame another, and when the delegates could not agree he proclaimed the present constitution. Though this was opposed by some natives, and still more by some foreigners, it proved acceptable to the mass of the people. He was energetic and fond of speculation, but of uneven temperament. He died at Honolulu, Dec. 11, 1872, and with him the direct line of the Kamehamehas ceased. As he had failed to name a successor the chiefs chose Prince Lunalilo to be king.

KANE, John Kent (1795–1858), an American jurist, was born at New York, May 16, 1795. His father removed to Philadelphia in 1801, and John, having graduated at Yale College in 1814, studied law with Judge Hopkinson and was admitted to the bar in 1817. Originally a Federalist, he became a prominent supporter of Gen. Jackson in his political career. He was city solicitor of Philadelphia in 1828–30, and in 1832 was appointed a commissioner of the French spoliation claims. He was the leader of the Democrats in the political embroglio at Harrisburg in 1838 known as the Buckshot War. In 1845 Gov. Shunk made him attorney-general of the State, and a year later Pres. Polk appointed him judge of the U. S. District Court at Philadelphia. During his term he was noted for his efforts to carry out the fugitive slave law. He had also been prominent in the legal controversies which grew out of the division of the Presbyterian Church in 1837. He died at Philadelphia, Feb. 21, 1858. (For his son, Dr. **Elisha Kent Kane**, the Arctic explorer, see **Encyclopædia Britannica**.)

See Vol. XIII. p. 851 Am. ed. (p. 842 Edin. ed.).

KANSAS was the twenty-first State admitted into the Union, the act of admission having passed Congress on Jan. 29, 1861. Its admission marked an important era in American history: not only was the central part of the United States then reached in the outreach of emigration from east to west, but the act marked the conclusion of a long and bitter struggle between the pro- and anti-slavery factions of the country. By the terms of the famous "Missouri Compromise" of 1820 it was agreed that of all the territory included in the Louisiana purchase from France that which lay north of lat. 36° 30′ was to be free soil. Under this belief Arkansas, lying south, was admitted as a slave State, and Iowa, lying north, as a free State, without dispute in Congress. But when, on May 30, 1854, an act was passed organizing the "Territory of Kansas," it was claimed by the pro-slavery members of Congress that the act of 1820 was annulled. From that time forward until 1860 the question of the extension of slave territory was agitated almost continually in Congress, the future status of Kansas being the text for debate. Many sanguinary conflicts were waged in the State itself between settlers from the Northern States and armed bands from the adjoining slave State of Missouri. The question of admitting the State into the Union hinged upon slavery or free soil. Conventions were held by the people in the interest of formulating a constitution and seeking admission. One of these favored a recognition of slavery, and when submitted to the people was declared adopted. It was afterwards shown that the election had been carried by fraudulent voters brought from Missouri and Arkansas. A second convention, which was held at Wyandotte in 1859, framed a constitution prohibiting slavery; this was submitted to a popular vote and carried, the vote standing, 10,421 for and 5530 against. After the withdrawal of the Southern members from Congress in 1860 this convention and constitution were recognized, and the State admitted at the date named.

Kansas ranks fourteenth in area among the States and twentieth in population by the census of 1880. In 1870 the population was 364,399, and in 1880, 996,096; the gain in the decade was thus 631,697, a larger numerical increase in the ten years than any other State in the Union, Iowa coming second with an increase of 430,595, and Nebraska third with 329,409. The number of families in the State was 197,693; of dwellings, 189,432; the number of persons to the square mile, 12.19; number of families to the square mile, 2.42; number of acres to each person, 52.49, and to each family, 264.51; the number of persons to each family, 5.04. The rate of increase in population during the decade from 1870 to 1880 has been fully maintained since 1880, and the unofficial census of 1886 places the population at 1,650,000.

Coal.—For the coal-bearing strata of Kansas see **Coal** in Vol. II. The coal is wholly bituminous, and is mined extensively. The production for recent years is as follows: In 1870, 32,938 tons; in 1877, 200,000 tons; in 1880, 763,597 tons; the average annual production from 1880 to 1886 was about 750,000 tons.

Agriculture.—The natural advantages of the State for the production of grains, vegetables, fruits, etc., are many and great. It has taken high rank among the States in recent years in both the quantity and quality of the products of its fields, orchards, vineyards, and gardens. The fertility of the soil, clearness, dryness, and semi-southern mildness of the climate, abundant and seasonable rainfall, give most favorable opportunities for the production of cereals and fruits of fine flavor and rich abundance. (For the farms in 1880 see article **Farms**.)

The average of the annual production of the principal vegetables for four years, 1876 and 1879 inclusive, is hereby given:

Product.	Number of bushels.	Number of acres.	Bushels per acre.	Average price per bushel.	Total value of crop.
Corn	88,254,950	2,434,666	36.7	$0.23	$20,092,798
Wheat	19,055,125	1,377,997	13.8	.79	14,541,661
Hay (*a*)	1,262,100	791,961	(*a*) 1.58	(*a*) 3.92	4,822,948
Oats	13,156,000	409,368	32.7	.21	2,692,220
Potatoes	4,302,250	50,121	8.5	.59	2,482,380
Rye	2,637,600	131,341	20.0	.40	1,062,281
Barley	1,674,550	73,114	22.0	.38	617,460
Buckwheat	75,475	4,711	16.0	.80	61,235
Tobacco (*b*)	770,000	1,100	(*b*) 700.0	(*b*) .10	77,000

(*a*) Tons. (*b*) Pounds.

As indicating the rapid increase in food production, a table is hereby given of the products of 1884:

Crop.	Bushels.	Bushels per acre.	Acres.	Price per bushel.	Total value.
Corn	172,800,900	36.7	4,708,473	$0.26	$44,928,234
Wheat	26,851,100	17.5	1,534,350	.27	20,943,858
Rye	4,583,500	17.0	269,280	.37	1,695,895
Oats	27,560,000	39.4	699,476	.21	5,787,600
Barley	347,490	18.5	18,794	.40	138,996
Buckwheat	27,720	9.2	2,999	.84	23,285
Potatoes	6,361,520	80.0	79,519	.52	3,307,990
Hay (*a*)	5,075,000	(*a*) 1.45	3,500,000	(*a*) 3.75	19,031,250
Total	....	....	10,812,891	......	$95,857,108

(*a*) Tons.

The corn crop of 1885 numbered 158,330,000 bushels, raised on 4,884,550 acres, and had a value at home of $38,013,600. Of wheat there was 11,197,000 bushels from 1,060,250 acres, and worth $7,278,050; oats, 27,145,000 bushels, 853,920 acres, $6,243,350.

Stock-raising is an important industry in this State. The short and comparatively mild winters, the abundance of pasturage and feed, and the quantity and excellence of living water—an important desideratum in a prairie country—combine to reduce the labor and expense of stock-raising to the minimum. The subjoined table is for the year 1884; this year is taken as being the nearest to an average for the past decade. As the statistics for this table were collected during the spring months, when vast numbers of stock belonging in the State were on ranches in adjacent Territories, the full extent of the live-stock interests do not appear:

Stock.	Number.	Average price.	Total value.
Horses	522,945	$72.57	$37,958,119
Mules	75,073	91.55	6,872,933
Milch-cows	526,933	33.60	17,704,949
Other cattle	1,395,200	27.12	37,837,824
Sheep	821,709	2.30	1,889,931
Hogs	2,103,725	7.03	14,789,187

The total number of all cattle in this year was 1,922,133. Of this number 403,648, or 21 per cent., were high-grade cattle.

Manufactures.—Though Kansas is an agricultural and horticultural State manufactures are numerous. For the erection of the necessary buildings there is an abundance of building-stone found everywhere; coal, for operating, is abundant and accessible; the natural water-powers of the State are considerable in certain localities. These all have combined to engage a large portion of the settlers in manufactures. The extension, too, of railways into all sections of the State has contributed to the same, in making the transportation of the necessary materials and products rapid and easy. From 1870 to 1880 the number of establishments for manufactures had increased from 1477 to 2803. In the latter year the capital invested amounted to $11,192,315; the average number of hands employed was as follows: Males above sixteen years of age, 11,140; females over fifteen years, 392; children and youth, 532. The total amount paid in wages during the previous year was $3,999,599; the value of the material used, $21,407,941, and the value of all products, $30,790,212.

Education.—Much interest is taken in education and abundant provision is made for supporting schools of all grades at the public expense. The sixteenth and thirty-sixth sections (1280 acres) of every township are set aside for school purposes. The total amount of land thus reserved aggregates 2,801,306 acres, and the average price is $4 per acre. In addition to this there have been special grants to university uses of 46,080 acres. The schools of the State are of all grades, high and normal being included, with a State Agricultural College at Manhattan and a State University at Lawrence. There are also schools for the deaf and dumb, for the blind, and reform schools, all sustained by the State. For the State and for each county there is a superintendent of instruction, elected biennially by the people; for school districts, a board of 3 members elected each for three years, one liable to change each year. For examining applicants for State certificates there is a State board of education; for examining teachers in the counties there are associated with the superintendent two holders of first-grade certificates, each to serve one year. For the care of the school funds there is a board of commissioners consisting of the State superintendent, secretary of state, and the attorney-general. Women may vote for school officers and hold school offices. No sectarian doctrine may be taught in the public schools, but the reading of the Bible without comment is not prohibited. For the improvement of teachers county teachers' institutes must be held annually; these are supported by an appropriation not to exceed $100, made by the board of county commissioners, and by funds received from persons attending and from those examined for certificates. These certificates are of first, second, and third grade, and continue in force two years, one year, and six months, respectively. Teachers must report to county superintendents and county superintendents to the State superintendent. The State treasurer must also report semi-annually to the State superintendent the amount of money in the treasury for the support of schools and subject to disbursement. There must be uniformity of text-books. All public schools are free, and children from 8 to 14 years of age must attend at least 12 weeks each year, unless they are excused by the school authorities or are taught elsewhere. The school age is from 5 to 21 years. The number of youth of school age in 1883–84 was 411,250; the number enrolled in the public schools, 303,601; average daily attendance, 207,339. The number of organized districts was 6706; number of school-houses, 6354, and of school-rooms, 7318; the average time of school was 114 days. The estimated value of all public school property was $5,715,582. The number of male teachers in 1882–83 was 3138, with an average monthly salary of $31.42; female teachers, 5145, salary, $24.95. The amount of the available school fund is $3,043,593, with an estimated value eventually of $13,500,000. The receipts for the year were $3,392,050, and the expenditures, $2,882,963. The number of schools, teachers, and pupils in the schools for higher education in 1882 was as follows:

Kind of school.	Schools.	Teachers.	Pupils.
Normal	5	29	1,028
Kindergarten	3	5	116
Secondary instruction	4	15	350
Superior instruction of women	1	21	56
Universities and colleges	8	81	1,342
Science	1	14	312
Theology	1		
Law	1	2	11
Deaf and dumb	1	7	171
Blind	1	8	53
Reform schools	1	18	72
Orphan homes, etc	2	4	

Religion.—Almost all denominations of Christians are to be found in the State, and the interest manifested in religion and morality is of a high character. The following is a list of the denominations reporting over 1000 members in 1880:

Denominations.	Organizations.	Clergymen.	Communicants.
Roman Catholic	120	79	70,000 pop.
Methodist Episcopal	220	209	40,430
Lutheran	139	77	17,000
Baptist	397	255	16,637
Christian	125	98	15,500
Presbyterian	281	181	11,369
United Brethren	26	132	6,552
Congregational	156	104	5,758
Dunkards	24	81	4,000
Friends	33	57	3,405
Methodist Episcopal South.	27	33	2,835
Protestant Methodist	22	72	2,600
Evangelical Association	21	46	2,430
Protestant Episcopal	31	26	1,949
United Presbyterian	50	37	1,841
Reformed	15	9	1,765
Cumberland Presbyterian.	48	26	1,232
New Mennonites	7	20	1,000

Political.—The State government is similar to that of all the Northern States in its constitution and administration. An amendment to the constitution prohibiting the manufacture, sale, and importation of all intoxicating liquors, including ale, beer, and wine, is in force, and is generally observed. Its effect on the production of spirituous liquors may fairly be represented by the report of the commissioner of internal revenue. A statement of the receipts for the year 1885 is given below, compared with similar receipts from Nebraska, a State similarly situated as to wealth, population, age, etc., but where no prohibitory law is in force.

State.	Spirits.	Tobacco.	Fermented liquors.	Penalties, etc.	Total.
Kansas	$67,347.86	$81,847.78	$20,826.38	$180.00	$170,202.02
Nebraska	1,795,931.31	61,687.23	111,086.59	2,389.06	1,971,094.19

(A. G. M.)

KANSAS CITY, a city of Missouri, in Jackson county, is situated on the right bank of the Missouri River and on the W. border of the State, its W. suburbs extending into the State of Kansas. It is in lat. 39° 4′ N., 94° 37′ 40″ W. long. It is by rail 283 miles W. by N. of St. Louis. Its growth and business development in recent years have been marvellously rapid, making it the second city in the State. It is the terminal-point of several important lines of railway, and is connected by a fine iron railway-bridge across the river with the railway-system of Northern Missouri. It is the chief collecting-point for the products of a vast extent of country to the westward and southward, and does a great wholesale and distributing business for the same region. The packing of pork and other provisions is a very prominent interest. The city has 13 banks (2 national) and a clearing-house, a board of trade, a large number of newspapers, extensive stock-yards for cattle and swine, numerous grain-elevators, and many large manufacturing establishments, etc., the leading articles turned out being car-wheels, railroad iron, flour, butterine, furniture. soap, brick, cigars, beer, shot, cooperage, boxes, and machinery. There are about 50 churches, 6 hospitals, and numerous public and private schools, a commercial college, 2 medical colleges, various orphanages and other charities, a fine U. S. court-house, a chamber of commerce, many good hotels, theatres, and other public buildings.

The site of Kansas City is high and naturally rough and uneven. Large sums of money have been expended in grading, paving, and sewering the streets, and in laying water- and gas-pipes, and great improvements are still in progress. Some of the streets have cable-railways. The city stands in a region rich in coal and in other valuable minerals, and its business is facilitated by cheap water-transportation for bulky freights. It was founded in 1830. Its population in 1860 was 4418; in 1870, 32,290; in 1880, 55,787; since which time its population has had an almost unexampled increase.

KAOLIN. See Clay.

KAPP, Friedrich (1824–1884), a German-American historian, was born at Hamm, Prussia, April 13, 1824. He studied law and became a referendary in his native city. He resigned his position to engage in the revolution of 1848, and afterwards went to Brussels, Paris, and Geneva. Finally in 1850 he removed to America, and became a lawyer in New York city. He also devoted much attention to the history and development of America, and travelled extensively in the United States. In 1866 he was appointed a commissioner of immigration at New York. In 1870 he returned to Germany, and in 1872 was elected to the German Reichstag, when he gave special attention to international questions and the foreign interests of Germany. He died at Berlin, Oct. 27, 1884. His principal works are *Die Sklavenfrage in den Vereinigten Staaten* (1854); *Life of Gen. Steuben* (1859; also in German, 1858); *Geschichte der Sklaverei in den Vereinigten Staaten* (1860); *Life of Gen. Kalb* (German, 1862; English, 1870 and 1884). He also published books on the Germans in the American Revolution, and on German immigration to America.

KARR, Jean Baptiste Alphonse, a French author, was born at Paris, Nov. 24, 1808. The son of a noted pianist, he was educated at the Collège Bourbon, in which he afterwards became an instructor. A youthful attachment inspired his first essays in verse, and a subsequent disappointment caused him to turn them into prose under the title *Sous les Tilleuls* (1832). Further echoes of his youth are found in his romances, *Une heure trop tard* (1833), and *Vendredi soir* (1835). He became chief editor of *Figaro* in 1839, and soon after issued *Les Guêpes*, a satirical review, which provoked personal attacks on its editor. Its popularity, however, was great, and Karr published at intervals five series. He also poured forth an abundance of romances and works of fancy, among which his *Voyage autour de mon Jardin* (1845; new ed., 1875). Karr became in fact a horticulturist at Nice, and more than one flower bears his name. His miscellaneous writings have been gathered into volumes and even a selection made, called *L'Esprit d'Alphonse Karr* (1877). His daughter Thérèse has published *Huit grandes époques de l'histoire de France* (1861) and other works.

KARSTEN, Hermann, a German botanist and traveller, was born at Stralsund, Nov. 6, 1817. He belongs to a family noted for scientific activity, and is often called "the younger" to distinguish him from his cousin Hermann (1809–1877), professor of astronomy and mineralogy at Rostock. The younger Hermann spent the years 1843–47, and again 1848–56, in scientific journeys in Venezuela, Columbia, and Ecuador. After his return to Germany he was made professor of botany in Berlin University, and in 1868 was called to a similar professorship in Vienna. In 1872 he resigned his chair and went to Switzerland, where he taught privately. His principal works are *Die Vegetations organe der Palmen* (1847); *Flora Columbiæ* (1857–66); *Anatomie und Physiologie der Pflanzen* (1865); *Chemdsmus der Pflanzenzelle* (1870); *Zur Geschichte der Botanik* (1870); *Deutsche Flora, pharmaceut-medizinische Botanik* (1880).

KAUFMANN, Constantin Petrovitch, a Russian general, was born in the Baltic provinces, in 1817, of poor parents. Having become distinguished as a military engineer, he was chief of staff in the Caucasus, and afterwards was employed in the war department. In 1864 he became governor-general of Wilna, and in 1867 of the border provinces, which were formed into the military division of Turkestan. Having defeated the Emir of Bokhara, he occupied Samarcand in May, 1868. He then turned his attention to Khiva, and in March, 1873, began a forward movement, which ended in the capture of that city in June. Although he afterwards retired from the city, Russian supremacy was established and the military division of Turkestan was enlarged to twice its original size.

KAUTZ, August Valentin, an American general, was born near Potzheim, Bavaria, Jan. 5, 1828. His parents emigrated to America in the same year, and in 1844 settled near Ripley, Ohio. August served as private in the First Ohio volunteers in the Mexican war, and at its close entered West Point Academy. Graduating in 1852 he became a lieutenant in the Fourth U. S. infantry and served in campaigns against the Indians. At the outbreak of the civil war he was made captain in the Sixth cavalry, and in the Peninsular campaign he commanded his regiment. In September, 1862, he became colonel of the Second Ohio cavalry, and he afterwards commanded a cavalry brigade in Kentucky. He took part in the pursuit and capture of Gen. John Morgan in Ohio, in July, 1863, and in Burnside's campaign in East Tennessee. He afterwards served in the Armies of the James and of the Potomac, and was engaged in cutting the railroads south and west of Richmond. In March, 1865, he was assigned to a division of the Twentieth corps, and Jan. 15, 1866, was mustered out. In July, 1866, he was made lieutenant-colonel of the Fifteenth infantry. He has prepared some manuals for minor officers.

KEARNY, Philip (1815–1862), an American general, was born at New York, June 2, 1815. He graduated at Columbia College in 1833, and studied law, but in 1837 became lieutenant in the First dragoons, commanded by his uncle, Col. S. W. Kearny. He went to France to study cavalry tactics and served as a volunteer in Algeria. He was afterwards on the staff of Gen. W. Scott, and in 1846 was made captain of a company which he equipped from his own means. He distinguished himself in the Mexican war, and lost an arm in the final assault on the city of Mexico. He afterwards served in California and Oregon, but resigned in 1851 and went to Europe, where he pursued military studies. In 1859 he served as a volunteer in the French army in Italy, and was present at Magenta and Solferino. On the outbreak of the civil war he returned to America, and was made brigadier-general of volunteers just after the battle of Bull Run. He commanded first a brigade in Gen. Franklin's division, then a division in Gen. Heintzelman's corps. He distinguished himself in the Peninsular campaign, and at the end of the second day's fight, though ordered to leave his sick and wounded, brought them off, while his division covered the rear of the retreat to the James. He was promoted major-general of volunteers July 4, 1862. He was killed in the battle of Chantilly, Va., Sept. 1, 1862. He excelled as a disciplinarian and was noted for his bravery.

KEARNY, Stephen Watts (1794–1848), an American general, was born at Newark, N. J., Aug. 30, 1794. Leaving Columbia College in 1812 he entered the army as first-lieutenant and was distinguished in the attack on Queenstown Heights, Canada. Remaining in the army he rose through the several grades to be colonel in 1836 and brigadier-general in 1846. He then had command of the army of the West, and on the declaration of war against Mexico he marched against Sante Fé. After capturing this city and establishing a provisional government he proceeded to California. He was twice wounded in a fight at San Pascual, Dec. 6, 1846. At Monterey, the capital of California, he found Commodore Stockton, U. S. navy, who had orders from Washington to conquer the Territory, and had appointed Capt. Fremont its governor. A dispute arose between the army and naval authorities which was settled in March, 1847, by orders from Washington making Gen. Kearny governor of California. In June he marched overland to St. Louis, and afterwards joined Gen. Scott's army. He was governor of Vera Cruz in March, 1848, and of the city of Mexico in May, 1848. He died at St. Louis, Oct. 31, 1848.

KEEN, William Williams, an American physician, was born at Philadelphia, Jan. 19, 1837. He graduated at Brown University in 1859, and in medicine at the Jefferson Medical College in 1862. He then entered the U. S. army as assistant surgeon and had charge of hospitals in Washington and Philadelphia. After the war he studied in Europe for two years and then settled at Philadelphia, where he became lecturer on pathological anatomy in the Jefferson Medical College and in the Philadelphia School of Anatomy. He has published *Early History of Practical Anatomy* (1874); *Surgical Complications of Continued Fevers;* and has edited the series of *American Health Primers.*

KEENE, a city of New Hampshire, county-seat of Cheshire county, stands on the Ashuelot River, 50 miles W. S. W. of Concord. It is at the junction of the Cheshire and the Ashuelot Railroad, and on a branch of the Boston, Lowell, and Concord Railroad. It is a remarkably attractive and well-built town, with wide and well-shaded streets. It has a court-house and other county buildings, 8 churches, a city-hall, a high-school, 4 national and 2 savings banks, a public library, and 2 weekly newspapers, and is the seat of varied and extensive manufactures. Among the goods produced are furniture, leather, pottery, bricks, carriages, sleighs, woollen-goods, etc. There are also shops for railway construction and repair, and extensive granite-quarries. The city has a fine central square whence radiate the five principal streets, and in which is a handsome soldier's monument. It is lighted by gas, and has an abundant water-supply, derived from a lake 3 miles distant. The population in 1870 was 5771; in 1880, 6784.

KEIL, Karl August Gottlieb (1754–1818), a German theologian, was born at Grossenhain, Saxony, April 23, 1754. He was educated at the University of Leipsic, and in 1785 was appointed professor of philosophy there. Two years later he was transferred to the chair of theology, which he held until his death, April 22, 1818. He is noted especially for his labors in hermeneutics, the principles of which he set forth in his *Hermeneutik des Neuen Testament* (1810). After his death some *Opuscula Academica* were published. He rejected allegorizing interpretation of Scripture, and gave attention to grammatical and historical elements.

KEITH, Alexander (1791–1880), a Scotch clergyman, was born at Keith Hall, Aberdeenshire, in 1791. He graduated at Aberdeen and became minister at St. Cyrus in 1816. His *Evidence of the Truth of the Christian Religion, derived from the Literal Fulfilment of Prophecy* (1824) proved very popular, and the author gave further attention to the Scripture prophecies in his *Signs of the Times* (1832). He afterwards withdrew from pastoral work and devoted himself to authorship. In 1839, being sent by the Church of Scotland as member of a commission of inquiry into the state of the Jews, he visited Palestine and Eastern Europe. His observations are found in *The Land of Israel* (1843) and some later works. When the Church of Scotland was divided in 1843 he joined the Free Church, and he continued in it his labors for the conversion of the Jews. He died at Buxton, Feb. 7, 1880.

KEITH, George (*c.* 1640–*c.* 1714), a religious controversialist, was born at Aberdeen, Scotland, about 1640. He was educated at Aberdeen University, being intended for the Presbyterian ministry, but he adopted Quaker views and in 1675 was associated with Robert Barclay in defending them. He afterwards assisted William Penn in controversies with the Baptists in London. He had charge of a Quaker school at Edmonton in 1682, and in 1684 suffered imprisonment for preaching and for refusing to take an oath. He then emigrated to America, where he was surveyor-general of East Jersey from 1685 to 1688. Afterwards he had charge of a school in Philadelphia, and then going to New England as a Quaker preacher had disputes with the Mathers. Returning to Philadelphia he began to accuse the Friends of deism, and when he went back to England he rebuked Penn himself for error on the atonement. Keith, however, was condemned by the annual meeting, and thereupon formed a body called "Christian Quakers" or "Keithians." Soon after he entered the Church of England, and was sent to America as a missionary. He labored chiefly among the Quakers and persuaded many to follow his example. He returned to England in 1706, and became rector of Edburton, Sussex. Here he died about 1714. He was a man of deep and varied learning. Besides theological works both for and against Quakerism, the chief of the latter kind being *The Standard of the Quakers Examined* (1702), Keith wrote narratives of his travels in America and a *New Theory of Longitude* (1709). See Janney's *History of the Friends* (1867).

KELLEY, William Darrah, an American statesman, was born at Philadelphia, April 12, 1814, being grandson of Major John Kelley, an officer in the Revolutionary army. After receiving a common-school education he was apprenticed to a jeweller, and he worked at his trade for five years in Boston. Returning to Philadelphia in 1839 he studied law and was admitted to the bar in 1841. He took part in politics as a Democrat and was attorney-general of Pennsylvania, 1845-46. He was judge of the Court of Common Pleas from 1846 to 1856, and in the meantime joined the Republican party. He was elected to Congress in 1860 and has remained there by successive elections till the present time, thereby becoming the "Father of the House." He was an ardent supporter of the war for the Union, an opponent of slavery, and above all a steady advocate of a protective tariff. He has been an able public speaker, and a volume of his *Speeches* has been published.

KELLOGG, Clara Louise, an American singer, was born at Sumter, S. C., in July, 1842. Her parents were natives of New England, her father being noted for his mechanical inventions and her mother for her skill as a musician. When Clara was an infant her parents removed to New Haven, Conn., and in 1856 they took up their residence in New York. Here Clara devoted herself earnestly to the study of music and modern languages, having the assistance of the best teachers of the time. After a successful private performance she appeared in the New York Academy of Music, Feb. 27, 1861, as Gilda in Verdi's *Rigoletto*. She was received with great favor in the principal American cities. On Nov. 2, 1867, she appeared at Her Majesty's Theatre, London, in *Faust*, with such success that she was immediately engaged for the following season. From 1868 to 1872 she remained in the United States, appearing both in comic and tragic opera. She then returned to England, where she sang in company with Nilsson. Towards the end of 1873 she formed a company to present English opera in America, and by her remarkable skill, energy, and business tact made it thoroughly popular. Her voice is a high soprano, of great compass and purity, and under perfect control.

KEMBLE, FRANCES ANNE, known as **FANNY KEMBLE**, an English-American actress and author, was born at London in 1811. She is the daughter of Charles Kemble (1775–1854), for whom see ENCYCLOPÆDIA BRITANNICA. In consequence of the financial embarrassment of the family she was induced to appear at the Covent Garden, London, in October, 1829, playing Juliet to her father's Romeo, her mother also appearing as the nurse. She became noted in the presentation of such characters as Juliet, Portia, Bianca, Belvidera, Lady Teazle, and Julia in *The Hunchback*. Accompanying her father in a tour in the United States in 1832 she was enthusiastically received. In 1834 having married Pierce Butler of Philadelphia she retired from the stage, but her marriage proving unhappy she separated from her husband and went to reside at Lenox, Berkshire county, Mass. She visited Europe in 1846, and in 1849 she obtained from the legislature of Pennsylvania a divorce from Mr. Butler, whereupon she resumed her maiden name. She afterwards gave readings from Shakespeare in the principal cities of the United States and England. Her residence was alternately in the two countries, with intervals of travel on the Continent. Her principal publications are *Journal of a Residence in America* (1835); *A Year of Consolation*, a narrative of her visit to Italy in 1846; *Residence on a Georgia Plantation* (1863); *Recollections of Girlhood* (1878); and *Recollections of Later Life* (1882).

KEMPER, REUBEN (died 1826), an American soldier, was born in Fauquier co., Va., being the son of a Baptist preacher, who removed to Ohio in 1800. Reuben with two brothers went to Mississippi as land-surveyors, and in 1808 raised an expedition against Baton Rouge, which failed. The Kempers were afterwards kidnapped by the Spanish, but were rescued by an American officer. Filled with revenge they severely punished those engaged in the attempt, and Reuben devoted himself to the expulsion of the Spaniards from America. His attempt against Mobile failed, but in 1812 he was major in the expedition of Gutierrez and Toledo against Mexico. Being afterwards chosen colonel of the force, numbering over 500, he marched into Texas, and fought and won several battles. But the fruits of victory were lost by dissensions between the Mexicans and Americans, and the latter returned to the United States. Kemper served under Gen. Jackson in the defence of New Orleans, and afterwards became a cotton-planter in Mississippi. He died at Natchez, Miss., in 1826.

KENDALL, AMOS (1789–1869), an American politician, was born at Dunstable, Mass., Aug. 16, 1789. He graduated at Dartmouth College in 1811, studied law and was admitted to the bar. In 1814 he removed to Lexington, Ky., and was for some months a tutor in Henry Clay's family. He afterwards settled at Georgetown, Ky., as a lawyer, and contributed to the *Argus*, a Democratic newspaper published at Frankfort. He strongly advocated the establishment of common schools and procured the passage of an act for a school fund. Being a warm supporter of Gen. Jackson, he was in 1829 made an auditor of the U. S. treasury, and in 1835 postmaster-general. He reorganized this department, relieving it of debt. Though retained in office by Pres. Van Buren, he retired in 1840, and thereafter held no public office. In 1845 he became the manager of Prof. Morse's interests in the electric telegraph. He was the founder and first president of the Deaf and Dumb Asylum at Washington, and he also contributed liberally to other charities. He died at Washington, D. C., Nov. 11, 1866. He was the author of a *Life of Andrew Jackson, Private, Civil, and Military* (1843), never completed, and an *Autobiography* (1872), edited by W. Stickney.

KENDRICK, ASAHEL CLARK, an American educator and author, was born at Poultney, Vt., Dec. 7, 1809. He graduated at Hamilton College, N. Y., in 1831, and became tutor in the literary institution afterwards Madison University. He remained as professor of Greek and Latin until 1850, when he was made professor of Greek in the newly established University of Rochester. He spent 1852–54 in travel and study in Europe. He has been a frequent contributor to reviews and magazines, has revised the translation of Olshausen's *Commentary on the New Testament* (6 vols., 1853–58), has translated the portion relating to the Epistle to the Hebrews in Lange's *Commentary* (1867). He has also published the *Life of Emily C. Judson* (1860), several Greek text-books, and some volumes of compilations. He was one of the revisers of the English New Testament whose work appeared in 1881.

KENNEDY, JOHN PENDLETON (1795–1870), an American politician and author, was born at Baltimore, Oct. 25, 1795. He graduated at Baltimore College in 1812, and was admitted to the bar in 1816. In 1820 he was elected to the State legislature, and was a member for three years. He showed a desire to sketch Southern life as Washington Irving had done that of New York. His *Swallow Barn* (1832) gave outlines of plantation life in Virginia; *Horse-Shoe Robinson* (1835) was founded on the story of a South Carolina Revolutionary soldier; and *Rob of the Bowl* (1838) related to the early history of Maryland. Kennedy entered Congress in 1838, and was prominent in the councils of the Whig party, and published *A Defence of the Whigs* (1844). In 1845 he lost his seat in Congress, and in 1846 he returned to the Maryland legislature, where he was chosen speaker. He used his leisure from political and professional pursuits to prepare the *Life and Correspondence of William Wirt* (2 vols., 1849). In 1852 Pres. Fillmore called Kennedy to be secretary of the navy. During his administration Commodore Perry's expedition to Japan was fitted out, and encouragement was given to Dr. E. K. Kane's Arctic explorations. In later life Kennedy gave much attention to the interests of his native city. In behalf of the Union cause he wrote *Mr. Ambrose's Letters on the Rebellion* (1865). He was provost of the University of Maryland from 1849 till his death. He was also chairman of the trustees of the Peabody Institute, and a member of many literary and scientific institutions. He suffered much from ill health, and made three voyages to Europe on that account. He died at Newport, R. I., Aug. 18, 1870. His *Works* have been published in 10 volumes, and his *Life* was written by H. T. Tuckerman (1871).

KENOSHA, a city of Wisconsin, shire-town of Kenosha county, is on Lake Michigan, 52 miles N. of Chicago and 35 miles S. of Milwaukee, with which cities it is connected by the Chicago and North-western Railway, a branch extending hence to Rockford, Ill. Among the principal buildings are the court-house and other county buildings, and four commodious public school-houses. Kenosha has 6 hotels, a national and one other bank, 3 weekly newspapers, 9 churches, and 3 private schools, one of which, Kemper Hall, is an Episcopalian institution, under the charge of the Sisters of St. Mary. Among the manufacturing establishments are extensive flouring-mills, planing-mills, wagon-shops, and works for the production of engines, wire-mattresses, fan-mills, leather, malt, files, wood-work, furniture, lumber, etc. It stands in a pleasant and healthful locality, and has good harbor and dock facilities. It is a neatly built, thriving, and attractive place, being known in the North-west as "the Park City." It was first settled in 1835, and was incorporated in 1850. The town has gas- and water-works and two public parks. The total valuation of property is $1,600,000; the public debt, $187,000. The population in 1870 was 4309; in 1880, 5039.

KENRICK, Francis Patrick (1797–1863), an American prelate, was born at Dublin, Ireland, Dec. 3, 1797. He was educated at Dublin and in the College of the Propaganda at Rome. Being ordained priest in 1821, he went to Kentucky to take charge of St. Joseph's College, Bardstown. During his nine years' tenure of this office he also visited various missions in the State. He published *Letters of Omicron to Omega* (1828), defending the doctrine of the Eucharist. He was consecrated bishop of Arath *in partibus* on June 6, 1830, and made coadjutor to Bishop Conwell, of Philadelphia. On the death of the latter in 1842 Bishop Kenrick succeeded him. About this time a strong anti-Catholic agitation pervaded the community, which culminated in the riots of 1844, in which two churches were burned by the mob. Bishop Kenrick exerted himself to preserve peace and order. He founded the theological seminary of St. Charles Borromeo, in Philadelphia. In 1851 he was made archbishop of Baltimore, and in May, 1852, as apostolic delegate, presided over the first Plenary Council of the United States. The primacy of honor was conferred upon the archbishops of this diocese in 1859. During the troubles attendant upon the civil war Archbishop Kenrick used his influence to sustain the government. He died at Baltimore, July 8, 1863. He was specially distinguished as a theologian, and his works are used as text-books in several seminaries. Among them are *Theologia Dogmatica* (4 vols., 1839–40); *Theologia Moralis* (3 vols., 1841–43); *Primacy of the Apostolic See Vindicated* (1845); *Catholic Doctrine of Justification* (1844); *Treatise on Baptism* (1843); *Vindication of the Catholic Church* (1853); *Concilia Provincialia Baltimore Habita* (1851). At the time of his death he was engaged on a revised English translation of the Bible from the Latin Vulgate, and had published the whole of the New Testament, the Pentateuch, and the poetical and prophetical books of the Old Testament.

KENRICK, Peter Richard, an American prelate, brother of the preceding, was born in the city of Dublin in 1806. He was educated at Maynooth, and after being ordained priest he removed to Philadelphia, where his brother was coadjutor. Besides pastoral labors he conducted the *Catholic Herald*, a weekly paper, translated several works, and published some original works. On Nov. 30, 1841, he was consecrated bishop of Drasa *in partibus*, and made coadjutor of St. Louis, with the right of succession. Having succeeded to that see in 1843, he was raised to the rank of archbishop in 1847. He greatly improved the financial state of his diocese, and, having received a large bequest in 1858, used it to endow hospitals and various charitable and educational institutions. He was present at the Vatican Council, and his speech opposing the declaration of papal infallibility was published, but he afterwards acquiesced in the definition. In 1872 Rev. P. J. Ryan was consecrated as his coadjutor. He published *The Holy House of Loretto* (1875), and *Anglican Ordinations* (1848).

KENSETT, John Frederick (1818–1872), an American painter, was born at Cheshire, Conn., March 22, 1818. He studied bank-note engraving with his uncle, Alfred Daggett, of New York, and gave some attention to painting. In 1840 he went to England, and in 1845 exhibited his first picture, a distant view of Windsor Castle. He afterwards went to Rome, devoting himself to landscape-painting. In 1848 he returned to New York, and henceforth produced many pictures of American scenery. In 1849 he was made a member of the National Academy. In 1859 he was appointed a member of the commission to superintend the decoration of the Capitol at Washington. His pictures are noted for their uniform excellence, truthfulness, and delicacy. Among them are View of Mt. Washington (1849); Hudson River from Fort Putnam (1856); Sunset in the Adirondacks (1860); Narragansett, Lake George (1864). He died at New York, Dec. 16, 1872.

KENTON, Simon (1755–1836), an American pioneer, was born in Fauquier co., Va., April 3, 1755. When 18 years old he had an affray with a young man about a love-affair. Believing he had killed his rival, he crossed the Alleghanies and joined Daniel Boone in Kentucky. He was employed by Gov. Dunmore as a spy, and became noted in warfare with the Indians. He was captured and taken prisoner to Detroit in 1778, but escaped in the following July. In 1782 he returned to his native place, but in 1784 went back with his father's family to Kentucky. He was actively engaged in conflicts with the Indians until peace was established by Wayne's expedition in 1793, in which Kenton was a major. Settlers now swarmed into the country, and Kenton, not having been careful to register his lands and secure perfect title to them, lost all his property. In 1802 he removed to Ohio, and in 1805 was made brigadier-general of militia. In the war of 1812 he fought with the Kentucky troops in Canada. In 1824 he appeared before the Kentucky legislature in behalf of his claims, and finally obtained release of his lands and a pension from Congress. He died in Logan co., Ohio, April 29, 1836.

See Vol. XIV. p. 43 Am. ed. (p. 41 Edin. ed.).

UNITED WE STAND DIVIDED WE FALL

KENTUCKY, an east central State of the American Union, is commonly classed as one of the Southern States. Its area according to the U. S. census of 1880 is 40,000 square miles. The name is of Indian origin, from Kan-tuck-kee, the "dark and bloody ground." The State was first explored in 1767 by a small party from North Carolina, headed by John Finley, and nine years later it was made a county of Virginia. After holding nine conventions, in the period from 1784 to 1790, during which time the idea of establishing an independent nationality was quite strong, Kentucky with the consent of Virginia became, in 1790, a separate Territory, and was admitted into the Union on June 1, 1792, the population of Kentucky then being nearly 74,000.

In the numerous Indian wars which followed the early settlement of Kentucky, as well as in the war of 1812 with England and in the war with Mexico in 1846, the inhabitants of the State proved themselves brave and patriotic. From the position of the State, and the strong ties of relationship which existed between the inhabitants of Kentucky and those of the other Southern States, it was only natural that the State should strongly sympathize with the Confederacy on the outbreak of the civil war in 1861. Yet the people were also strongly attached to the Union, and at the opening of the civil war the State tried to maintain a neutral position. Eventually, although a large number of the inhabitants enlisted in the Confederate army, there were more than twice the same number who were enrolled and carried arms in the cause of the

Union. Some families were divided and enlisted on opposite sides during the continuance of the civil war, but after its cessation all animosities were buried and the State has since that time devoted herself to the development of her agriculture, stock-raising, and mining interests, the latter having received special attention since the opening of increased means of internal communication consequent upon the construction of railways. With her great diversity of industries, her central position, fertile soil, and salubrious climatic conditions the prosperity of the State should be assured.

By the census of 1880 the white population numbered 1,377,179, and the colored, 271,511; the males, 832,590; females, 816,100; native-born, 1,589,173; foreign-born, 59,517. The population to the square mile was 41.2; number of dwellings, 286,600; persons to a dwelling, 5.75; number of families, 302,631; persons to a family, 5.45.

The value of taxable property as assessed in 1885 was as follows: Real estate, $332,318,266; personal property, $58,509,679; railroads, $33,047,644; total, $423,875,589.

The amount raised by taxation in the year 1880 was $1,766,000.39, the rate of State tax being 52½ cents per $100; there is no capitation tax in this State. The amount of State debt July 1, 1885, was $674,000 at 6 per cent.; the amount in sinking fund, $711,346; the State receipts for year ending June 30, 1885, were $3,233,363.69, and the expenditures $2,825,150.03.

Education.—The public school age is from 6 to 20 years; the school population in 1883 was 581,322; the white school enrolment was 250,682, with an average daily attendance of 156,742; the colored youth in public schools numbered 31,832, with an average attendance of 21,930. The total expenditures for white public schools in 1883 was $700,790. The State contained 15 colleges, with 27 instructors in the preparatory department, and 114 instructors in the collegiate department. The number of students in preparatory department was 825 and in collegiate department 1182. The income from productive funds was $56,825, and from tuition fees $64,292; there were 49,290 volumes in the college libraries, and the value of ground, buildings, and apparatus was $707,000.

Agriculture and Stock-raising.—Kentucky is the leading tobacco-producing State in the Union, and is also among the foremost States in the production of Indian corn. The following table shows the products of the cereals, potatoes, hay, tobacco, etc., for the year 1884:

Products.	Bushels produced.	Average bushels per acre.	Number of acres.	Average price per bushel.	Total value.
Indian corn.....	71,880,000	22.1	3,258,410	43	$30,908,400
Wheat............	13,425,000	10.6	1,272,000	74	9,934,500
Rye........	846,000	8.8	96,234	60	507,600
Oats...............	7,865,000	18.4	427,430	35	2,752,750
Barley............	459,000	22.3	20,594	60	275,400
Buckwheat......	12,000	10.2	1,225	70	8,400
Potatoes..........	3,728,000	73.0	51,067	40	1,491,200
Tobacco, lbs.....	208,692,000	756.0	276,139	7.5	15,651,900
Hay, tons.......	351,000	1.30	270,000	$9.75	3,422,250
Total.........	....	....	5,673,099	....	$64,950,400

The total tobacco crop of the United States for 1884 is placed at 541,504,000 pounds, of which it will be seen from the above statement that Kentucky produced more than 38 per cent.

Kentucky is especially famous for the speed of the trotting and running horses bred in the State. Since the U. S. census of 1880 there has been an increase in the number and value of horses, mules, and cattle, but there has been a marked decrease in both sheep and hogs. The facilities for transporting mutton in a frozen condition from Australia to Europe has caused a decline in the price in all the principal markets of the world, and the small margin of profit which has of later years ruled in the lamb and wool markets of the Eastern States has caused the sheep husbandry of the State of Kentucky to become unprofitable. The closing of the German and other foreign markets against the hog product has caused the raising of hogs to adjust itself to the demands of the home market.

The number and value of farm animals in the State in 1884 was as follows:

Animals.	Number.	Average price.	Value.
Horses	371,878	$68.40	$25,436,455
Mules.....................	116,061	76.49	8,877,506
Milch-cows.................	304,720	33.21	10,119,751
Oxen and other cattle...	503,877	26.90	29,923,908
Sheep......................	950,761	2.66	2,529,024
Hogs	2,052,665	4.73	9,709,105

Railroads.—The total length of railroad lines open in the State in 1884 was 2521 miles, of which 1943 miles were operated. The capital stock of the railroads was $61,401,013; the funded debt, $102,700,662; total investment in railroads, $170,559,413, and the cost of railroad equipment, $141,621,990. The interest paid on bonds amounted to $2,260,866, and dividends paid on stock to $400,000.

Mining Interests.—During the past few years especial attention has been paid to discover the correlation of the coal measures of Kentucky with those of Pennsylvania, Ohio, and West Virginia. (For a full statement of these see the article on COAL, in Vol. II.) A thick coal of great purity, which has been named the "Elkhorn coking coal," has been discovered in the south-eastern portion of the State. This coal has been identified and traced over a large area on the headwaters of the Big Sandy, Licking, Kentucky, and Cumberland Rivers, where it is found to be from 8 to 9 feet thick, with conditions favorable for cheap mining. The coal production of Kentucky from 1875 to 1884 was as follows:

Year.	Tons.	Year.	Tons.
1875...............	500,000	1880............	1,000,000
1876...............	650,000	1881............	1,100,000
1877...............	850,000	1882............	1,300,000
1878...............	900,000	1883............	1,650,000
1879...............	1,000,000	1884............	1,555,000

The iron ores of Kentucky embrace most of the known varieties, and are found in large quantities and are widely distributed. The most important iron-making district in Kentucky is the Hanging-Rock district, the ore being derived principally from Bath county; the ores used average about 48 per cent. metallic iron. On the 1st of January, 1884, there were 18 blast-furnaces in the State. The production of pig-iron from 1880 to 1884 was as follows:

Year.	Short Tons.	Year.	Short Tons.
1880...............	57,708	1883...............	54,629
1881...............	45,978	1884	45,052
1882...............	66,522		

Petroleum has been found in several localities in the State, the best-known district being the "Marshall Tract," which is on the Tennessee line, where two shallow wells produce about three barrels each per day. Several oil-springs exist along the banks of the Big Sandy River in Martin county, and another field has recently been discovered in Montgomery county.

Manufactures.—The manufacture of whiskey is the most largely developed of the manufacturing industries of Kentucky. The total amount of whiskey and other spirituous liquors produced in 1885 was 13,458,995 gallons, while in 1882 it had reached 30,386,456 gallons. The U. S. internal revenue from this source in 1885 was $13,160,083.91. (C. T. D.)

KEOKUK, a city of **Iowa,** one of the county-seats of Lee county, is pleasantly situated at the south-east angle of the State. It is on the Mississippi River, 205 miles above St. Louis, at the foot of the "Des Moines Rapids," to surmount which a canal 11 miles long extends from Keokuk northward. This canal cost the U. S. government about $5,000,000, and affords great water-power. Nine important railroads either traverse the city or terminate in it. The Mississippi River is here crossed by a railroad bridge, which connects the city with the towns of Warsaw and Hamilton, Ill. Among the important buildings and institutions are the U. S. court-house and post-office, the public library, the college of physicians and surgeons, the law school, the commercial college, and the charity hospital. The city is lighted with gas and electricity, has street-railways, water-works, a fine public park. There are 12 hotels, 2 national and 2 other banks, 5 daily and 3 weekly newspapers, and numerous factories and mills, including lumber- and flour-mills, foundries, etc. The total valuation of property is $13,869,000. The population in 1880 was 12,117.

KEY, FRANCIS SCOTT (1779–1843), an American lawyer, author of *The Star-Spangled Banner*, was born in Frederick co., Md., Aug. 1, 1779, being son of John Ross Key, a Revolutionary officer. He was educated at St. John's College, studied law at Annapolis, and in 1801 commenced practice at Frederick, but in a few years removed to Washington, D. C., where he was made district attorney. Being detained by the British fleet during the bombardment of Fort McHenry, near Baltimore, Sept. 13, 1814, his feelings found vent in the verses which have become our national lyric. They were written out on his return to Baltimore, and soon diffused widely through the country. Key was the author of some other songs, as well as hymns and poems, which were collected and published in 1857. He died at Baltimore, Jan. 11, 1843.

KEYES, ERASMUS DARWIN, an American general, was born at Sturbridge, Mass., May 29, 1811. In early life he removed to Maine. He graduated at West Point in 1832, and entered the artillery service. He was instructor of artillery and cavalry at West Point from 1844 to 1848, and afterwards served on the North-west frontier. On the outbreak of the civil war he was made colonel of the Eleventh infantry, and at the first battle of Bull Run he commanded a brigade. Being made brigadier-general, he commanded the Fourth corps of the Army of the Potomac under Gen. McClellan, and was actively engaged in the Peninsular campaign, gaining promotion to major-general of volunteers. In May, 1863, he was engaged in an expedition to West Point, Va., and in June in Gen. Dix's expedition against Richmond. He resigned May 6, 1864.

KEY WEST, a city and port of entry of Florida, county-seat of Monroe county, is at the W. end of a coral island, itself called Key West (a corruption of the Spanish name *Cayo Hueso*, or Bone Reef), otherwise known as Thompson's Island, which lies 60 miles S. of the mainland of Florida. The island is 7 miles long from E. to W., and is from 2 to 3 miles wide, having a maximum elevation of 11 feet above high tides. At the S. W. angle of the island is a lighthouse in 24° 32′ 58″ N. lat., 81° 48′ 7″ W. long. The island is of coral formation and the soil is thin and hard, but responds well to cultivation, producing good crops of garden vegetables and the principal tropical fruits. The island is the most southern land in the United States. The name "Bone Key" is said to have been derived from the long-unburied bones of Indians slain in an inter-tribal battle about the year 1700. Key West was settled in 1822, and in the same year was named Port Rodgers, and made a port of entry. It was also known as Allenton. U. S. barracks were built here in 1824. In 1828 the town of Key West was incorporated, and the first city charter dates from 1832. The city is regularly laid out with wide and straight streets. The buildings are largely built of wood, but limestone, quarried upon the island, is also used in construction. Among the buildings are a city hall, government barracks, county court-house, jail, custom-house, U. S. court-rooms, marine hospital, etc. Fort Taylor, the principal fortification, is a casemated pentagonal work of brick, and other defensive works have been commenced on the island. The excellent harbor facilities and important position of Key West, standing as it does at the principal entrance to the Gulf of Mexico, early rendered its occupation as a U. S. naval station a necessity. Its situation near a dangerous reef in a sea greatly frequented by shipping has caused the business of salvage and wrecking to become prominent in the city, and the U. S. admiralty court which has its seat here is principally occupied with salvage cases. Other leading pursuits are the taking of fish, sponges, and turtle, the manufacture of salt by solar evaporation, and the making and shipment of cigars. The city has 6 churches, public, private, and parochial schools, 2 banks, gas-works, and street railways. The climate is warm and remarkably equable, being free from extremes of heat and cold. Hence the city has become a great place of winter resort, especially for consumptive patients. The population is cosmopolitan, a large proportion being of African descent. Of the white inhabitants many are Cubans expatriated. The population in 1870 was 5016; in 1880, 9890.

KIDD, WILLIAM, a pirate, was born in Scotland, being the son of John Kidd, a non-conforming minister. Entering on a sea-life he became a bold and skilful captain, and engaged in privateering against the French in the West Indies. In 1695 the earl of Bellomont, governor of New York, desiring to suppress the piracy then prevalent, organized a company which bought in England the Adventure Galley, a new vessel of 287 tons and 34 guns. Captain Kidd, one of the adventurers, had command, being commissioned both by the company and the king. The anticipated booty from the pirates was to be divided between the company and Kidd, the king receiving one-tenth. On his way from Plymouth to New York Kidd captured a French fishing-vessel. He left New York on Sept. 6, 1696, and sailed to Madagascar, in the vicinity of which he cruised for nearly a year without meeting any pirates. Then his turbulent crew, impatient for their share of booty, induced or compelled him to attack and capture the Quedagh Merchant, an East Indiaman. Burning his own vessel, he transferred his men and stores to his prize. Professing still to act under his original commissions he seized other vessels. In April, 1699, he returned to the West Indies with a large amount of treasure, and leaving his ship near Hayti sailed in a small sloop to the coast of Long Island, whence he sent a message to Bellomont, then at Boston. The latter assured him of safety if he were innocent of the charges made against him, and induced Kidd to come to Boston. A week after his arrival, July 1, 1699, Kidd was arrested, and on demand of the British admiralty was sent to England, where he arrived April 1, 1700. Political complications delayed his trial for a year; but at last, in spite of his assertions of innocence, he was found guilty, first, of killing William Moore, his gunner; and, secondly, of piracy. The evidence was perhaps insufficient, and he was not allowed counsel nor proper facilities for defence. He was hanged at London, May 24, 1701. In the sailors' ballad he is called Robert Kidd. Treasure which he had buried on Gardiner's Island was recovered by Bellomont, but the Quedagh Merchant was burned by its crew. The stories about his burying treasure at various places, though long current, are unfounded.

KIEPERT, HEINRICH, a German geographer, was born at Berlin, July 31, 1818. Under the instruction of Ritter he devoted himself to geography. He explored Asia Minor in 1841–42, and became director of the geographical institute at Weimar in 1845. He removed to Berlin in 1852, and after delivering lectures for some years was made professor in the University in 1859. He was appointed to a position in the statistical bureau in 1865. Among his noteworthy publications are *Atlas von Hellas* (1840–46; revised ed., 1866); maps for Dr. E. Robinson's *Palestina* (1843); maps for Lepsius' *Monuments of Egypt* (1849–59); *Historisch-geographischer Atlas der alten Welt* (1848), which has passed through numerous editions; *Neuer Handatlas der Erde* (1857–60), subsequently enlarged.

KIMBALL, Richard Burleigh, an American novelist, was born at Plainfield, N. H., Oct. 11, 1816. He graduated at Dartmouth College in 1834, studied law for a year, and then went to Europe. On his return he practised first at Waterford, N. Y., but in 1840 removed to New York city. He was a frequent contributor to the *Knickerbocker* and other magazines. He has published *St. Leger* (1850); *Cuba and the Cubans* (1850); *Romance of Student Life Abroad* (1853); *Undercurrents* (1862); *Was he Successful?* (1863); *In the Tropics* (1863); *Prince of Kashna* (1867); *Henry Powers, Banker* (1868); *To-day, a Romance* (1870); *Emilie* (1872).

See Vol. XIV. p. 81 Am. ed. (p. 79 Edin. ed.).

KINDERGARTEN. The development of the Kindergarten in the United States since 1881 has been almost phenomenal. Its rapid growth is the natural outcome of a number of previous events that need to be mentioned here. In 1877 there had been formed in Boston the American Froebel Union, which devoted itself to the diffusion of correct information concerning Froebel's principles and methods, and frowned down a number of attempts to establish spurious "Kindergarten systems," called forth by the popularity of the name. In the same year *The New Education* appeared in Milwaukee; it was strengthened the next year by its union with Miss Peabody's *Kindergarten Messenger*. By giving much prominence to the application of Froebel's principles and methods in the school-room, it enlisted the sympathies of teachers, and lifted the Kindergarten out of its isolation into the full companionship of other educational forces. Dr. Felix Adler established a Kindergarten in connection with the noble work of his *United Charities*, and avowedly as the necessary and essential foundation of his educational work. Subsequently his words kindled a great enthusiasm in California, which resulted in the establishment of many charity Kindergartens; and in Boston Mrs. Quincy Shaw had caught the fire, and gave annually large sums for a system of free Kindergartens scattered through all parts of the city. At the same time the St. Louis experiment had proceeded favorably in the face of many obstacles; and Milwaukee, where children are admitted to school at the age of four years, had been thoroughly aroused to an appreciation of the value and need of the Kindergarten in the public schools.

All these things induced many teachers and other philanthropic ladies to study the system at a number of training schools in different parts of the country, thus insuring soundness as well as rapidity of growth. The report of the commissioner of education, together with reliable and full reports from local sources, warrants the statement that in 1882 there were in the United States 500 Kindergartens, attended by 20,000 children and 1000 teachers.

New impetus was given to the work in the spring and summer of 1882. The 21st of April of this year was celebrated in many cities and towns as Froebel's centennial anniversary with appropriate exercises, in which thoughtful addresses and the touching fervor of children in suitable games stirred the souls of many. These celebrations led to the organization of the *Froebel Institute of North America*, in the summer of the same year, at Detroit, Mich. The organizers had come from the shores of the Atlantic and Pacific, from the valleys of the St. Lawrence and Mississippi. The institute assumed the work of the American Froebel Union, and added to it the purposes of establishing local organizations and of showing the practicability of Froebel's principles in their application to primary schools. At the educational meeting at Madison, Wis., in 1884, the Froebel Institute united with the National Educational Association in a memorable exhibit of the results and possibilities of Kindergarten work in public and private institutions, in the Kindergarten proper, and in the primary school. The beauty, comprehensiveness, and judicious arrangement of the exhibit, as well as the deliberations of the Froebel Institute, swept away from the minds of thousands all doubt concerning the practical value of the Kindergarten and Kindergarten work, and kindled an abiding enthusiasm, which went out into as many communities, and is spreading to this day. The National Educational Association gave expression to this feeling in the establishment of a special Kindergarten department as one of its sections; and in 1885, at Saratoga, adopted the following resolution:

> "In view of the recognized value of Kindergarten education in training the sensibilities and the will, and in developing self-activity, it is
>
> "*Resolved*, That we trust the time is near at hand when the true principles of the Kindergarten will guide all elementary training, and when public sentiment and legislative enactment will incorporate the Kindergarten into our public-school system."

A true appreciation of the growth of the Kindergarten in the United States necessarily carries us, therefore, into the public schools, where we find every department quickened by its spirit, and the primary department more and more unreservedly adopting its methods. Normal schools consider a Kindergarten department a necessary adjunct of their practice schools, and usually require the teacher of this department to instruct the graduating classes in the principles and methods of Froebel.

There is steady development, too, in the free or charity Kindergartens of large cities—notably in San Francisco, Chicago, Cincinnati, Philadelphia, New York, and Boston—where philanthropic persons and societies expend annually large sums in the establishment and support of excellent Kindergartens in the most needy localities. Lately, too, endowment has found a field in this thoughtful work which deserves permanent encouragement; for, even if public schools should open their doors to the Kindergarten, it will be many years before legislation will admit children at a sufficiently early age to reap its full benefits.

A noteworthy application of the Kindergarten has been made in the education of the blind at the Kentucky Institute in Louisville, and at the Perkins Institute in Boston. In both cases the experiments, which involved many ingenious devices in the use of the working material, were successful beyond the most sanguine expectations, and many other schools for the blind have consequently established Kindergartens for their youngest inmates.

Thus has it been realized to a remarkable degree Froebel's prophecy that America, because of her "superior conditions for the development of genuine family life, and of pure genuine humanity," is best adapted to the development of his educational system. In this connection it is worthy of note that—while elsewhere greatest stress is laid on the merely utilitarian phases of the Kindergarten, on its nursery features, the technical skill it gives, the preparation it furnishes for school studies and the like—the Kindergarten in the United States lays greatest stress upon its intensely religious foundation, its powerful effect upon the development of social virtue and mental independence and spontaneity, and its constant and strict regard to the requirements of harmonious development, of which happiness and efficiency are unerring symptoms.

In other countries, too, there has been steady progress. In Canada, Ontario has incorporated the Kindergarten with the public schools in several of its cities, and in her provincial normal school is preparing teachers for this work. Brazil and the Argentine Republic have given it similar recognition; and the City of Mexico has become enthusiastic from the accounts of visitors to the New Orleans Exposition. In Europe, Switzerland has engrafted it upon the public schools in the Canton of Geneva, has established a great number of private and communal Kindergartens in other cantons, and is opening the doors of primary schools to its occupations as rapidly as circumstances permit. Belgium has connected the Kindergarten organically with her primary schools; and the same is true, though to a more limited extent, of some portions of the Austrian Empire, particularly of Lower Austria. In Italy, Venice and Naples are leading to success in enterprises which are partly aided by the government; in the majority of communal schools a room is set apart, an *asilio*, for the reception of children between the ages of three and six years, and the Kindergarten spirit is getting hold of these slowly and steadily. Germany still leaves the development of the Kindergarten to private effort and to the philanthropic zeal of a number of educational associations that conduct training-schools and free or partly free Kindergartens; the slowness of its introduction in primary public schools is largely due to the prevailing employment of male teachers, who are ill adapted to Kindergarten work. In the public schools of Great Britain, too, possibly for a similar reason, the Kindergarten methods have made little progress; although private Kindergartens are flourishing, especially in England.

Special mention should be made of France, where the *École Maternelle*, the lowest department of primary instruction, is conducted largely in accordance with the principles and methods of the Kindergarten, although it is, in a still higher degree, a public nursery or *crèche*. It admits children at the close of their second year, and keeps them until they have reached the seventh year of age. The teachers are carefully selected and prepared for their work. According to the *Annuaire* of 1886 there were, at the beginning of the school-year, 1884–85, 5617 such schools in which 693,431 children received the care of 8456 teachers.

Recent English Literature.—Bertha von Marenholtz-Bülow, *Reminiscences of Froebel*, translated by Mrs. Horace Mann; *Mother's Songs, Games, and Stories*, a thoughtful translation of Froebel's *Mutter- und Koselieder*, by Frances and Emily Lord; *Kindergarten Culture, History of Pedagogy*, and other *Lectures*, by W. N. Hailmann. The *Proceedings* of the National Educational Association, the Froebel Institute of North America, and the *Reports* of the Commissioner of Education contain much interesting and valuable material. *The American Teacher* devotes a department to this subject, under the title, *Kindergarten and Primary Education*. (W. N. H.)

KING, Charles (1789–1867), an American journalist and educator, was born at New York, March 16, 1789. He was the son of Rufus King, and was educated at Harrow, England, while his father was U. S. minister to Great Britain. He afterwards entered the banking-house of Hope & Co., Amsterdam, and in 1806 returned to New York. He was a member of the State legislature in 1813, and served as a volunteer in 1814. At the close of the war with Great Britain he was sent to England to investigate the treatment of the Dartmoor prisoners, and exonerated the British authorities from blame. In 1823 he became associated with Verplanck in editing the *New York American*, and was active in journalism until 1849, when he was made president of Columbia College. He held this position until 1864. He died at Frascati, Italy, Sept. 27, 1867. He published an account of the Croton Aqueduct (1843); *History of the New York Chamber of Commerce; New York Fifty Years Ago*, and various addresses.

KING, Rufus (1755–1827), an American statesman, was born at Scarborough, Maine, March 24, 1755, being the son of Richard King, a wealthy merchant. He graduated at Harvard College in 1777, studied law at Newburyport, Mass., and was admitted to the bar in 1780. He was elected to the legislature of Massachusetts in 1782, and in 1784 was delegate to the Continental Congress. In March, 1785, he presented a resolution prohibiting slavery in the Northwest Territories of the United States. By a vote of 7 States to 4 the resolution was referred to the committee of the whole, where the question slumbered for two years. It was then substantially incorporated in the ordinance of 1787 for the government of those Territories. King was one of the commissioners to determine the boundary between New York and Massachusetts. With his colleague, Nathan Dane, he conveyed to the United States the claim of Massachusetts to lands west of the Alleghanies. In the convention which framed the Federal Constitution he was one of the committee of five to revise its style and arrange the articles. He was afterwards a member of the Massachusetts convention, which ratified the Constitution in the same year. Having, in 1786, married the daughter of John Alsop, of New York, King removed to that city in 1788. Here he was equally prominent as a Federalist, and in 1789 was elected to the first U. S. Senate. He displayed great ability and zeal in defence of Jay's treaty with Great Britain, and was joined with Hamilton in preparing the essays in its behalf signed "Camillus." He was re-elected to the Senate in 1795, and was appointed minister to Great Britain in July, 1796. He held this position for eight years, although on the accession of Pres. Jefferson in 1801 he had asked to be recalled. After his return to the United States in 1804 he lived on a farm at Jamaica, L. I., but in 1813 he was again elected to the U. S. Senate. After the capitol was burned in August, 1814, he opposed the removal of the seat of government, and in a memorable speech called the nation to avenge the outrage. In 1816 he was nominated for governor of New York by the Federal party and was defeated. He remained in the Senate, however, and in 1819 was re-elected, though the majority of the legislature was opposed to him in politics. His efforts were directed to restoring the financial and commercial prosperity of the country, and to maintaining the mercantile rights and interests of the United States. He also established the system of cash payment for the sale of public lands. When Missouri applied for admission as a slave State King was conspicuous in opposition, and resisted Clay's famous compromise. In March, 1825, Pres. John Quincy Adams appointed King U. S. minister to Great Britain, and the latter reluctantly accepted, but ill health compelled his return in 1826. He died at Jamaica, L. I., April 29, 1827. He was an able diplomatist, an accomplished orator, and a patriotic statesman.

KING, Thomas Starr (1824–1864), an American clergyman, was born at New York, Dec. 16, 1824. When he was preparing to enter Harvard College his father, a Universalist minister, died, leaving the family in straitened circumstances. Thomas obtained employment as a clerk and afterwards as a teacher, and after some theological study began to preach in September, 1845, in Woburn, Mass. In 1846 he was settled as pastor over his father's former parish in Charlestown, Mass., but in 1848 he was called to the Hollis Street Unitarian Church, Boston, and remained with it until the spring of 1860 when he removed to San Francisco. He had already been widely noted as an eloquent lecturer, but the secession movement roused him to yet greater efforts and success. His speeches in every part of California taught the people the value of the Union and the danger of lukewarmness at that crisis. Not less able and effective were his labors in behalf of the U. S. Sanitary Commission, which thus obtained the means to carry on its noble work. He published but one book, *The White Hills, their Legends, Landscapes, and Poetry* (1859). After his death some of his writings were gathered into a volume, *Patriotism and other Papers* (1864). He died at San Francisco, March 4, 1864.

KING, WILLIAM RUFUS (1786–1853), an American statesman, was born in Sampson co., N. C., April 6, 1786. He graduated at the University of North Carolina in 1803, and was admitted to the bar in 1806. In the same year he was elected to the legislature, and in 1807 he was appointed State solicitor for the Wilmington circuit. After holding this office two years he was again elected to the legislature. In 1810 he was elected to Congress, where he acted with the war-party. In 1816 he resigned his seat to become secretary of legation under William Pinckney, then U. S. minister to Naples and afterwards to Russia. Returning home in 1818, he removed to Dallas co., Ala., where he henceforth resided. He assisted in framing the State constitution of Alabama in 1819, and was chosen U. S. Senator from the new State. This position he held until 1844, acting uniformly with the Democratic party. From 1824 he advocated the election of Gen. Jackson to the Presidency, and he continually supported the views and policy of that leader. In 1844 King was appointed by Pres. Tyler U. S. minister to France, and was successful in preventing that country from joining with Great Britain in a protest against the annexation of Texas. He returned to the United States in November, 1846, and re-entered the Senate in 1848. When Vice-Pres. Fillmore became President in July, 1850, King was unanimously elected president of the Senate. In 1852 he was elected Vice-President of the United States on the ticket with Franklin Pierce, but his health had already begun to fail, and in January, 1853, he went to Cuba. Not being able to return by March 4, the day of inauguration, he was permitted by special act of Congress to take the official oath at Havana. A few weeks later he returned to his home in Dallas co., Ala., where he died April 18, 185

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KING-FISHER. The *Alcedinidæ*, or king-fishers, form a group remarkable for brilliant coloration and for their variety of curious and aberrant forms. Their characteristic habit is to sit motionless watching for their prey, to dart and seize it on the wing, and return to their original position to swallow it. Some members of the family are insect-eaters, and nest in holes of trees, but the North American species nest in holes in the banks of streams and are fish-eaters. There are but two American species, included in the single genus *Ceryle*, which is thoroughly aquatic and piscivorous *C. alcyon*, the belted king-fisher, has a long, straight, and strong bill, with a wide gape; short wings; tail rather long and broad; legs small, with tarsi short and stout. The head is decorated with a long, thin, pointed crest. The color is ashy-blue above and pure white beneath, with the sides of the body under the wings and a band across the breast like the back in color. The tail has transverse bands and spots of white. Length 12–13 inches. This species extends throughout North America, being only forced south by the freezing of the water in winter. It is very unsocial, being never seen but in pairs, and these rarely together. It may be noticed by the side of streams, mill-ponds, or lakes, seated so as to overlook the water, into which it seldom plunges in vain. It swallows its prey whole in emerging, occasionally ejecting the undigested scales and bones from its stomach. Its cry is loud and harsh, something like a watchman's rattle, and is particularly heard at night during the breeding-season, when its loud, rattling notes are often very annoying. Its nest is made in deep holes which it excavates in the banks of streams or sides of cliffs, always in dry gravel and above the reach of inundation. These holes are dug from 4 to 15 feet in depth, yet they are excavated with great rapidity They are sometimes straight, sometimes bend near the termination. They all terminate in a wider space, where the eggs are deposited, usually on the bare sand. Usually 6 eggs are laid, of a clear, crystal whiteness. The bird is very tenacious of the location of its nest, and will return to it even after being several times robbed of its eggs. The other American species is *Ceryle Americana*, the Texas or green king-fisher. It is much smaller than the preceding, its head-crest being small. In color it is of a glossy green, with a cervical collar and all the under parts white with green spots. Length about 8 inches. It only comes as far north as Texas, but is abundant on the gulf coast of Mexico and in the interior of Central America. Its habits are about the same as those of *Alcyon*, and its nests are made in the same manner.

KINGLAKE, ALEXANDER WILLIAM, an English historian, was born at Wilton House, near Taunton, in 1811. He was educated at Eton and Trinity College, Cambridge, graduating in 1832. He was called to the bar at Lincoln's Inn in 1837, but retired from practice in 1856. His literary reputation was founded by his brilliant *Eothen* (1844), giving his experiences of eastern travel. Strange to say he was for a long time unable to find a publisher. In 1857 he entered Parliament as a Liberal, and in 1858 he opposed the Conspiracy Bill. In this and other cases he showed his hostility to Napoleon III. as a political adventurer. Still further was this feeling manifested in his history of *The Invasion of the Crimea* (1863–1881), a work intensely interesting in spite of its prolixity and its strongly partisan tone. In 1868 Mr. Kinglake was returned to Parliament for the borough of Bridgewater, but was unseated on petition.

See Vol. XIV. p. 84 Am. ed. (p. 82 Edin. ed.).

KINGLET. The birds known by this name comprise about 10 species of elegant little creatures, being the smallest of our birds except the humming-bird. They compose the genus *Regulus*, and are found in Europe, Asia, and America. Two of the species, *R. satrapa* and *R. calendula*, are American, being found throughout the length and breadth of the country. *R. satrapa*, the golden-crowned kinglet, is less than 4 inches in length, of an olive-green hue above and ashy or yellowish-white beneath. Its crown is of a black hue, which encloses a large space of an orange-red color encircled by pure yellow. It is abundant in woodlands and shrubbery, and is a lively and attractive bird, with a chirping sound and sometimes a prolonged succession of pleasing notes. Its food is almost exclusively the smaller winged insects, which it seeks among the highest tree-tops of the forest. It is expert at taking its prey on the wing. At other seasons, like the titmice, it ransacks the crevices of the bark for food. Little is known of its breeding habits, its nest and eggs not having been discovered. It is supposed to build a pensile nest and lay from 6 to 10 eggs, like *R. cristatus* of Europe, which it closely resembles. The remaining American species, *R. calendula*, the ruby-crowned kinglet, has a rich scarlet patch, partly concealed, on the crown of the male. Otherwise it is not very dissimilar to the other species in color. Its average length is about 4½ inches. It is found in all parts of North America, from Greenland to Guatemala. Its breeding habits are unknown. Its song much surpasses that of any other species, and is composed of a prolonged series of clear, high, and resonant notes, varying from lowest to highest, with which it terminates. It has been compared to that of the canary, but in some respects it more resembles the song of the skylark. The feeding and other habits of this species are closely similar to those of *R. satrapa*, though it is said to eat the stamens of fruit blossoms.

See Vol. XIV. p. 85 Am. ed. (p. 83 Edin. ed.).

KINGS, FIRST AND SECOND BOOKS OF. The evidence commonly cited in proof that these books were originally one, and have been divided, proves no more than that anciently, as now, the two were counted as one book in the schemes for reducing the thirty-nine books of the Old Testament to twenty-two or twenty-four.

Probably Prof. W. Robertson Smith, the author of the article on these books in the ENCYCLOPÆDIA BRITANNICA, would not claim that the views there set forth agree with the statements of the Old Testament, taken as they stand, nor that they agree with any evidence which exists anywhere in the form of historical testimony. An essential part of the foundation on which his work stands is the idea that the writers of this literature wrote for other purposes than to convey historic truth, and that their statements cannot be depended upon; that there exists, indeed, no evidence that is properly such either for his own view or for any other; that all views of the subject merely amount to more or less happy conjectures. But even if this assumption were correct the conjectures which do not contradict the evidence as it stands ought to be preferred to those which do contradict it.

The Books of Kings formally cite older works to which they refer, 1 Kings xi. 41, and often later; the Books of Judges and Samuel contain no such formal citations. The Books of Kings pronounce a definite sentence of approval or disapproval on most of the monarchs whom they mention, 1 Kings xi. 6, and xv. 3, 11, etc.; no sentence of this kind is found in the earlier books. The Books of Kings habitually denounce the high-place worship, 1 Kings xi. 7, and xiv. 23, etc.; not so Samuel and Judges. Except in the earlier chapters the Books of Kings are linguistically different from Judges and Samuel. Any one reading the first chapter of Kings sees at once that what is there said respecting David is not of the nature of a continuation of the history of David, but is for the purpose of introducing the history of Solomon. It is true that the Books of Kings take up the history at the point where the Books of Samuel leave it; but it is also true that they bear every mark of being an entirely different literary work from the Books of Samuel, and of having been produced at a much later period.

As sources for the history of David the Books of Chronicles refer to works of Samuel, Gad, and Nathan, 1 Chron. xxix. 29; as sources for the reign of Solomon they refer to works of Nathan, Ahijah, and Iddo, 2 Chron. ix. 29; for the reigns of Rehoboam and Abijah they refer to works with which the names of Shemaiah and of Iddo are connected, 2 Chron. xii. 15, and xiii. 22; for subsequent reigns they refer to writings of Jehu, the son of Hanani. Now the names of Nathan, Ahijah, Shemaiah, Jehu, and, according to Josephus, that of Iddo also, are connected, in the narratives in Kings, with the same reigns with which they are connected in the references in Chronicles. It is at once suggested that the chronicler here refers either to these narratives in Kings, as they now stand, or else to earlier writings by these prophets, from which the narratives in Kings were themselves taken. The literary resemblances between these narratives and the Books of Samuel confirm the suggestion. Add to this that the Books of Kings themselves refer, not to these writings of prophets, but to "the Acts of Solomon," and to certain books of "Chronicles"—works whose titles naturally suggest official records—and we have the materials for a very simple theory of the origin of the Books of Kings, which will account for all the existing phenomena, and which has some positive evidence in its favor.

This theory is stated as follows: From the days of Solomon to the Exile there was produced in Israel and Judah a succession of writings by prophets, more or less historical in character. Public records were also kept. The Books of Kings were produced from these two sources, mainly by the simple process of copying such passages as the compiler found himself inspired to copy for the purpose, doubtless with just such changes and occasional comments as appear in the Book of Chronicles, in the passages there taken from Samuel and Kings. This hypothesis is consistent with the integrity of the book, and explains its diversities of style, its abrupt transitions, its occasional rough joinings of parts, and all the other like phenomena which occur. There is no need to suppose that the original documents had been previously edited into continuous histories before the compiler of Kings used them. There is no need to suppose that any part of the book has passed through the hands of successive editors or redactors since it was first compiled. It is possible that the work of compiling was done at two or three different periods. The post-classical character of the Hebrew of the last chapter suggests the probability that it, at least, is later than the rest, and therefore that the rest was completed before the burning of the temple.

Most of the difficulties in regard to the text in Kings may be naturally accounted for by the way in which the book was produced. A writer working in this way would use works of unequal literary merit, and might sometimes transcribe without change statements of fact that were ill written. Other passages, both in what he transcribed and in what he himself added, need the light of the omitted parts of the context, and are obscure for lack of it. In such circumstances one should not be hasty in asserting, from internal evidence merely, that an ancient text is corrupt and needs emendation.

At first thought the parallel passages in Chronicles seem to be of the nature of variant copies of those portions of the text, and to have weight against the opinion that the text has been handed down with verbal accuracy. But a close examination shows that most of these variations are either short abridgments, or modernizations, or insertions of particles, evidently made by the author of Chronicles for the sake of a more flowing narrative, or else are longer insertions of new matter, generally in Hebrew that is decidedly of the later age; that is, that most of the differences are to be attributed to the author of Chronicles, and not to the copyists of either book.

Nor can the text of the Books of Kings fairly be pronounced corrupt on the authority of the Septuagint; at least, it cannot till we know better what the original correct text of the Septuagint was. At present, large portions of the Septuagint of these books are something very different from an exact translation of our present Hebrew text; but we know that much of the difference is to be explained by the lack of exactness with which the translation was made and transmitted; we do not yet know that any part of it needs to be explained by assuming the existence of errors in the Hebrew.

The peculiarities of the construction of the book should not be forgotten in our inquiries as to its chronology. Nothing is more likely than that different writers should use numerals in different ways, or that these peculiarities should be conveyed by transcription into the compiled work, thus giving it the appearance of being contradictory in its numerical statements. All the phenomena of the numbers given in the Books of Kings are readily explained in this way, without admitting even a single numeral to be mistaken. Those who account for them by supposing that the numbers are a later interpolation are obliged also to regard a large proportion of them as mistakes. In the article on ISRAEL it is shown that the history and the chronology of these books are alike consistent and probable.

The most notable recent English work on Kings is the Commentary on 1 Kings, by Rev. Joseph Hammond and others, in the series known as the *Pulpit Commentary*. For other notices of the literature see ISRAEL. (W. J. B.)

KINGSBOROUGH, EDWARD KING, VISCOUNT (1795–1837), an English archæologist, was born Nov. 16, 1795. Having conceived the notion that the Aztecs were of Jewish origin, he devoted himself to the collection and publication of Mexican antiquities. Having been confined for a time in a debtors' prison he contracted a fever, of which he died at Dublin, Feb. 25, 1837. Seven volumes of his great work had already been published and two more were issued after his death. Its title is *Antiquities of Mexico, comprising Fac-similes of Ancient Mexican Paintings and Hieroglyphics, together with the Monuments of New Spain, by M. Dupaix* (1831–48). It was partly intended to support his theory of the Jewish origin of the native Mexicans. Though valuable as a collection of materials, it is confused in arrangement and sometimes faulty in details.

KINGSLEY, Calvin (1812–1870), an American bishop, was born at Annsville, Oneida co., N. Y., Sept. 8, 1812. He was licensed to preach in 1837, and, having graduated at Allegheny College, Meadville, Pa., in 1841, he joined the Erie M. E. Conference. He was then made a professor of mathematics in Allegheny College, and when the State of Pennsylvania withdrew public funds from the colleges in 1843 he was employed for a year to secure its endowment. In 1856 he became editor of the *Western Christian Advocate*, and in 1864 he was elected bishop. To this work he devoted himself with the energy and faithfulness which had marked his previous career. In 1867 he visited the missionary conferences of Germany and Scandinavia. In May, 1869, he started on an episcopal tour around the world, and visited the conferences on the Pacific slope, then China, India, Egypt, and Syria. He died at Beyrout, Syria, April 6, 1870. Besides some controversial treatises and sermons he published *Resurrection of the Human Body* (1845); *The Hermits* (1868); *Round the World* (1870).

KINGSTON, a city of New York, seat of justice of Ulster county, stands on the W. bank of the Hudson River, 90 miles N. of New York city. The Rondout Creek here joins the Hudson and affords excellent harbor facilities. The city, formed in 1872, includes the former villages of Kingston, Rondout, and Wilbur. It is on the West Shore and Buffalo Railroad and is the terminus of the Ulster and Delaware and Walkill Valley Railroad. It is also the N. E. terminus of the Delaware and Hudson Canal, which connects it with the coal region of Pennsylvania. On the opposite side of the Hudson is the village of Rhinebeck, which is also a railway centre. At Kingston a large number of steamboats are owned, chiefly engaged in the river traffic. Many coasting vessels receive and discharge their lading here, and Kingston is the principal centre of the hydraulic cement business in the United States, and it also ships great quantities of bluestone, a metamorphic Devonian sandstone, and an excellent material for flagging. The city has large and varied manufactures, 5 national banks, 3 savings banks, a fire department, county buildings, an almshouse, a city hall, 4 hotels, 4 private halls, and a good public-school system. Population in 1880, 18,344.

KIOWAS, a tribe of North American Indians, whose range, now much restricted, formerly extended from the Platte River south-westward to the Rio Grande. They are regarded by most recent authorities, and with good reasons, as belonging to the great Shoshone stock, to which also the Comanches belong; these two tribes being, in respect to their habitats, remarkably aberrant offshoots of the parent stem. When Lewis and Clarke first brought them to notice they were already possessed of horses, which they rode and managed with marvellous skill and grace. They were also redoubtable warriors, hereditary enemies of the Dakota tribes which inhabited the country to the northward of them, and not less hostile to the Pawnees. With the Mandans and Arickarees of the upper Missouri they appear to have been on friendly terms. So much of their lives was spent on horseback that when on foot they shambled awkwardly. They dwelt in skin tents or lodges, which they carried about with them when engaged in the chase or following their many foes. They were great hunters of the bison, and followed the great herds of that animal northward and southward on their regular migrations. They bred many horses and some cattle. They carried spears, shields, bows and arrows up to a comparatively late date, when they adopted fire-arms from the whites. The men wore their hair long, and braided it in three, four, or five plaits, but the women cut their hair close. They were, it would appear, very prompt to resent the intrusion of white men into their hunting-grounds, and made captives of trappers and traders. They had a high reputation for bravery, but were considered much more treacherous than most other Indians, and were conspicuous for extreme cruelty to captives. They never were a numerous tribe, for their incessant wars prevented a rapid increase. The government in 1853 began to pay them an annual subsidy, for which they agreed to refrain from acts of hostility; but this agreement was not well kept on the part of the Indians. In 1859 they were expelled from Texas by the whites, and for nearly twenty years they continued to be very unquiet. In 1871 their chief, Santanta, conducted severely cruel raids in Texas, but was soon after taken prisoner and sentenced to death, but finally pardoned. They now live on a reservation in the south-west of the Indian Territory, together with some Apaches and Comanches. The Kiowas number less than 2000 souls. Latterly they have begun to pay some attention to the rearing of live-stock, an occupation to which their country is well adapted, and to which their own previous way of life renders them well fitted. (C. W. G.)

KIP, William Ingraham, an American bishop, was born at New York, Oct. 3, 1811. He was educated at Rutgers and Yale Colleges, graduating at the latter in 1831. He studied law, but afterwards studied theology in the General Theological Seminary, New York. He was ordained deacon in 1835, and became rector of St. Peter's Church, Albany, N. Y., in 1838. He was consecrated missionary bishop of the Pacific coast, Oct. 28, 1853, and soon after was made bishop of California, which position he still holds. He has been a frequent contributor to periodicals and has published *The Double Witness of the Church* (1844); *Early Jesuit Missions in North America* (1846); *Early Conflicts of Christianity* (1850); *Catacombs of Rome* (1854); *Unnoticed Things of Scripture* (1868).

KIRCHHOFF, Gustav Robert, a German physicist, was born at Königsberg, March 12, 1824. He studied mathematics and natural sciences in the university of his native city and graduated in 1846. He lectured at Berlin on mathematical physics in 1848, and at Breslau on experimental physics in 1850. He was made professor of natural philosophy at Heidelberg in 1854. His articles on electricity, heat, and tension of vapors, published in Poggendorff's *Annalen* and Crelli's *Journal für Mathematik*, attracted much attention. His discovery in 1859 of the law of the emission and absorption of rays led to the method of spectrum analysis, which he developed in connection with R. W. Bunsen (see Bunsen, R. W., Vol. I., p. 676). Among his publications are *Untersuchungen über das Sonnenspectrum und die Spectren der chemischen Elemente* (1861), which has been revised in later editions, and *Vorlesungen über analytische Mechanik* (1874).

KIRK, Edward Norris (1802–1874), an American clergyman, was born at New York, Aug. 14, 1802. He graduated at Princeton in 1820, studied law, but afterwards graduated at Princeton Theological Seminary and became agent in the Southern States for the American Board of Foreign Missions. In 1828 he was installed pastor of a Congregational Church at Albany, N. Y., but resigned in 1837 on account of ill-health. After a visit to Europe, he was in 1839 appointed secretary of the Foreign Evangelical Society. He was pastor of the Mount Vernon Church, Boston, from 1842 till his death. He retained his interest in evangelical mission work on the continent of Europe, and in 1856 visited Paris to establish American Protestant worship there. Towards the close of his life he lost his sight, but, though obliged in 1871 to resign the active duties of his pastorate to a colleague, still took part in church work. He died at Boston, March 27, 1874. He published *Lectures on the Parables*, two volumes of *Sermons*, and translated Gaussen's *Theopneusty*.

KIRK, John Foster, an American historian, was born at Fredericton, New Brunswick, in 1824. He was educated in Nova Scotia, and removed to the United States in 1842. He was the secretary of William H. Prescott, the historian, from 1847 to 1859. Thus led to intimate acquaintance with the history of modern Europe, he prepared his valuable *History of Charles the Bold of Burgundy* (3 vols., 1863–68). He also revised the last edition of Prescott's historical works, and contributed to various periodicals. From 1871 to 1885 he was editor of *Lippincott's Magazine*. He was then made professor of American history in the University of Pennsylvania.

KIRKBRIDE, Thomas Story (1809–1883), an American physician, was born near Morrisville, Bucks co., Pa., July 31, 1809. He studied medicine at the University of Pennsylvania, and on graduating in March, 1832, was appointed resident physician at the Friends' Lunatic Asylum, Frankford, in the suburbs of Philadelphia. For two years he was resident physician of the Pennsylvania Hospital, Philadelphia, and in October, 1840, he was made superintendent of the Pennsylvania Hospital for the Insane, which was opened in 1841. This institution was highly successful under his charge, and at his suggestion was divided in 1859 into two departments, male and female. The *Rules and Regulations* (1850), prepared by him, his treatise on *Hospitals for the Insane* (1854), and his annual reports, 42 in all, have been a guide to others engaged in the same benevolent work. He frequently contributed to the *American Journal of Medical Sciences* and to the *American Journal of Insanity*. He died at Philadelphia, Dec. 16, 1883.

KIRKLAND, Caroline Matilda (1801–1864), an American author, was born at New York city in January, 1801, being the daughter of Samuel Stansbury, a bookseller. After his death the family removed to Western New York, where Miss Stansbury was married to William Kirkland (1800–46), who had been professor in Hamilton College. With him she resided first at Geneva, N. Y., then in Michigan, and finally, in 1843, returned to New York city. Some of her letters to friends were revised for publication under the title *A New Home— Who'll Follow?* (1839). She continued in the same vein in *Forest Life* (1842) and *Western Clearings* (1846), then published *An Essay on the Life and Writings of Spenser*, and undertook the editorship of a magazine. In 1848 she visited Europe, and recorded her impressions in *Holidays Abroad*. Her writings were usually pleasant sketches and essays relating to American life, and marked by clear common sense. Her later years were given to the causes of education and philanthropy. She died at New York, April 5, 1864.

KIRKLAND, Samuel (1744–1808), an American clergyman, was born at Norwich, Conn., Dec. 1, 1744. He graduated at Princeton College in 1765, and was ordained to the Congregational ministry. He spent forty years as a missionary among the Oneida Indians, and during the Revolutionary war was a chaplain in the American army. In 1789 he received from the government a grant of land two miles square, now in the town of Kirkland, N. Y. In 1793 he conveyed a part of this grant to the Hamilton Oneida Academy, which has proved the germ of Hamilton College (*q. v.*). He died at Clinton, N. Y., Feb. 28, 1808. See his *Memoir*, by S. K. Lothrop, D. D., in Sparks' *American Biography*.

His son, John Thornton Kirkland (1770–1840), was pastor of a Congregational church in Boston from 1794 to 1810, and president of Harvard College from 1810 to 1828, when he resigned after a stroke of paralysis.

KIRKWOOD, Daniel, an American mathematician, was born in Harford co., Md., Sept. 27, 1814. He received an academical education, and afterwards taught in academies in Pennsylvania. In 1851 he was made professor of mathematics in Delaware College, and its president from 1854 to 1856. He then became professor of mathematics in the Indiana University, which position he still occupies. He is chiefly noted for his attempt to point out an analogy between the periods of rotation of the primary planets, first published in 1849. He has also used the nebular hypothesis to explain the nature of the asteroids and the hiatus in Saturn's ring. He has published *Comets and Meteors* (1876).

See Vol. XIV. p. 105 Am. ed. (p. 103 Edin. ed.).

KITE. These birds, the sub-family *Milvinæ* of the family of falcons, are of no great strength and less than average size, though very active and of graceful shape and movements. They belong to the "ignoble" class of birds of prey, since they subsist on small game, principally insects and reptiles. North America possesses four genera, *Elanus*, *Elanoïdes*, *Ictinia*, and *Rostrhamus*. The Mississippi kite (*Ictinia subcœrulea*) is a common bird of the south and south-west parts of the Gulf States. It extends to Central America, and to the northern States of the Mississippi valley, being very abundant in summer in Southern Illinois. It is a strong, easy, and rapid flyer, sailing through the air in broad and graceful circles, much like the turkey-buzzard. Its principal food is a large cicada, though it also takes grasshoppers and occasionally small snakes. These it seizes while sweeping past, using both feet and bill. Its nest is made in the tops of the highest trees, loosely composed of sticks, and lined with moss and dry leaves. *Elanus*, the pearl kite, is allied to *Ictinia*, but differs in coloration. It has a weak bill and very small feet. *E. glaucus*, the black-shouldered or white-tailed kite, is a common species of the Southern United States, extending to South America. It is very abundant in California. It is a stronger and more predacious bird than the Mississippi kite, and feeds on small birds, mice, gophers, and snakes, as well as insects. It is a swift flier, its habit being to poise like the sparrow-hawk and plunge on its prey with great velocity. Its ordinary flight is a very graceful and easy movement, it seeming almost to float upward or sink in the air without volition. It nests on low trees near rivers, and builds a nest not unlike a crow's nest, in which it lays 4 to 6 yellowish-white eggs spotted with brown. *Elanoïdes*, the swallow-tailed kite, is characterized by an extremely long and deeply forked tail, the length of which nearly equals that of the wing, which is also very long, thin, and acute. It has short and stout feet and a weak bill. There is only one species, *E. forficatus*, which is allied to the old-world *Milvus*, the typical kite. This is one of the most elegant and graceful of the kites, and is superlative in ease and grace of flight. It floats over the greater part of America, and even wings its way across the Atlantic. Stray individuals have been several times found in England and Scotland. It is irregularly distributed in the United States, being nowhere abundant except in the Gulf States and along the western rivers. It nests from Wisconsin and Iowa southward, the nests being made of dry sticks and twigs on tall trees near the water. Eggs 4 to 5, creamy-white in hue with rust-colored blotches. The swallow-tailed kite has a singularly pleasing appearance on the wing, gliding in large circles without apparent effort, its flight being astonishingly rapid. When circling its forked tail is wide-spread, its wings almost motionless. Its cry is a sharp and plaintive note. It feeds on insects, small snakes, lizards, frogs, etc. *Rostrhamus*, the sickle-billed kite, has two or three American species; *R. sociabilis plumbeus*, known as the everglade kite, being the only one found in the United States. It is not uncommon in the everglades of Florida. It has a long and slender bill, the upper mandible being hooked in a sickle form. It differs from birds of prey ordinarily by being sociable in its habits. Six or 8 specimens are often seen flying or sitting together. It is very unsuspicious, and may be easily approached. It feeds on a species of fresh-water mollusk. In flight and habits it bears a close resemblance to the marsh hawk. The nest is made of carelessly arranged sticks on tall raw grass or bushes in the everglades. The eggs, commonly 2, are yellowish-brown in hue, shading to nearly black in blotches. (C. M.)

KLACZKO, Julien, a Polish author, was born at Wilna, Lithuania, Nov. 6, 1828. He studied at Königsborg University, being made Ph. D. in 1846. After a long residence in Germany he went to Paris, where he was active in the *Revue des Deux-Mondes.* In 1869 Count von Beust, grand chancellor of Austria, called him to a position in the Aulic council, but Klaczko resigned in 1870. He was afterwards compelled by ill health to spend some years in Italy, but in 1875 returned to Paris. His most noted work is *Les deux Chanceliers* (1876), a bitter attack upon Bismarck and Gortschakoff. Among his political works are *Une annexion d'autrefois en Allemagne* (1862); *Études de Diplomatie contemporaine* (1866). He has also published *La Poésie polonaise au XIXe Siècle* (1862), and some works in Polish.

KLAPKA, György, a Hungarian general, was born at Temesvar, April 7, 1820. Entering the military service in 1838 he passed into a Hungarian regiment of the imperial life-guards, and in 1847 was appointed an officer in a regiment on the frontier. In 1848 he joined in the effort for Hungarian independence and so distinguished himself that in January, 1849, he was placed at the head of an army corps. Here he displayed remarkable prudence, and with raw troops maintained the line of the Theiss against the Austrian veterans. He shared, however, in the defeat at Kapolna, Feb. 27, but afterward, under Görgei, contributed to several victories. His most memorable exploit was his sortie from Komorn, Aug. 3, which compelled Windischgrätz to retreat and laid open to the Hungarians the road to Vienna. But the opportunity was lost through Görgei's want of promptness, and Klapka resigned the ministry of war which he had held a short time. He retired to Komorn again, and after further disasters elsewhere had destroyed all hope of Hungarian independence, finally surrendered on honorable terms, Oct. 4, 1849. Gen. Klapka passed to England, and thence to Italy, and to Switzerland, where he was naturalized in 1855. His hostility to Austria was unremitting, and in 1859 and 1866 he raised Hungarian legions to fight against her. When Austria-Hungary was reconstructed in 1867, the amnesty permitted him to return to his native land. He was elected a deputy and assisted in the reorganization of the army. During the troubles of Turkey he went to Constantinople and offered his services but was not employed. He has been engaged in the construction of railroads in Turkey. He has published *Memoirs of the War of Independence in Hungary* (1850); *The National War in Hungary and Transylvania* (1851); and *The War in the East* (1855).

KLEIST, Heinrich von (1776–1811), a German poet, was born at Frankfort on the Oder, Oct. 10, 1776. After serving in the army for some time he devoted himself for a time to philosophy and mathematics, and later was employed in the civil service. The degradation of his country and his own sufferings under the tyranny of Napoleon weighed upon his spirits, and though as a dramatist scarcely inferior to Goethe, he was frequently driven from literature in disgust. After alternate seasons of hope and despair, he committed suicide at Wansee, near Potsdam, Nov. 21, 1811. He had previously shot his friend, Henrietta Vogel, the wife of a rich merchant, a highly gifted woman, who had become infected with his infatuations. After his death his works, especially his dramas, attained great popularity, and they still maintain their place on the German stage.

KNAPP, Jacob (1799–1874), an American preacher, was born at Otego, Otsego co., N. Y., Dec. 7, 1799. He was trained as an Episcopalian, but joined the Baptist Church in 1819. After studying at the Theological Institution, Hamilton, N. Y., he became pastor of the Baptist church at Springfield, N. Y. He also taught school and managed a farm. In 1830 he removed to Watertown, and after being active in a religious revival there gave up his secular employment and labored as an evangelist. He was soon called to preach in the most prominent churches. At times, however, his life was threatened by mobs, and the civil authorities were called upon to protect him and his hearers. His preaching tour extended from New England to Missouri, and a few years before his death he visited California. He died at Rockford, Ill., March 2, 1874. He published an *Autobiography* (1870).

KNAPP, Samuel Lorenzo (1783–1838), an American author, was born at Newburyport, Mass., Jan. 19, 1783. He graduated at Dartmouth College in 1804, was admitted to the bar of Massachusetts, and was colonel of a militia regiment in the war of 1812. He published *Travels of Ali Bey in North America* (1818); *Biographical Sketches of Eminent Lawyers, Statesmen, and Men of Letters* (1821); then edited various journals in Boston, and afterwards practised his profession in New York city. Here he published *Lectures on American Literature* (1829); *Sketches of Public Characters* (1830); *American Biography* (1833); Lives of *De Witt Clinton* (1828); *Aaron Burr* (1835); and *Female Biography.* He died at Hopkinton, Mass., July 8, 1838.

KNAUS, Ludwig, a German painter, was born at Wiesbaden, Oct. 5, 1829. He received instruction from Jacobi, and afterwards studied at Düsseldorf under Sohn and Schadow. He became famous by his admirable pictures of German peasant life. He resided in Paris from 1853 to 1861, but afterwards returned to Germany, and settled at Düsseldorf in 1866. His works are rich in humor and command high prices. They are widely distributed from Vienna to London, and several have been brought to America. Among these are The Old Beau, My Little Brother, Priest and Poacher.

KNEELAND, Abner (1774–1844), an American preacher and writer, was born in 1774. He was first a Baptist minister, but became a Universalist and finally a deist. While residing in Philadelphia he edited a Universalist paper from 1821 to 1823. He afterwards edited the *Olive Branch* at New York, and in 1832, at Boston, he founded *The Investigator* as an organ of free-thinking. In 1836 he was tried for blasphemy before the Supreme Court of Massachusetts. He died at Salubria, Ind., Aug. 27, 1844. Besides a translation of the New Testament, with the Greek text (1822), he published *The Deist* (1822); *The Doctrine of Universal Salvation* (1824); *Review of the Evidences of Christianity* (1829); and other works.

KNEELAND, Samuel, an American naturalist, was born at Boston, Aug. 1, 1821. He graduated at Harvard College in 1840, and at the Massachusetts Medical School in 1843. After further medical study at Paris he practised medicine at Boston. He was secretary of the Boston Natural History Society for five years and of the American Academy of Arts and Sciences for two years. He was also engaged in scientific explorations in Brazil, in the Lake Superior copper region, and in the Sandwich Islands. During the civil war he was an army surgeon, serving chiefly at New Orleans and Mobile. In 1866 he was made secretary of the Massachusetts Institute of Technology and professor of zoölogy and physiology there. From 1866 to 1869 he edited the *Annual of Scientific Discovery.* In 1874 he made a scientific visit to Iceland. He has published *The Wonders of the Yosemite Valley*

(1871), edited some medical works, and contributed frequently to scientific periodicals.

KNOBEL, Karl August (1807–1863), a German theologian, was born at Tzschecheln, Lusatia, Aug. 7, 1807. He was educated at Soran, studied theology at Breslau, and in 1835 became professor extraordinary of theology in the same university. In 1839 he was made professor of theology at Giessen. Here he died May 25, 1863. He is especially noted for his exegetical commentaries on various books of the Old Testament, including Ecclesiastes (1836), Isaiah (1843), and the Pentateuch (1852). He also published *Prophetismus der Hebräer* (1837) and *Völkertafel der Genesis* (1850).

KNOLLYS, Hanserd (1598–1691), an English Baptist minister, was born at Chalkwell, Lincolnshire, 1598. He was educated at Cambridge University, and took orders in the Church of England, but afterwards becoming a Baptist was ejected for non-conformity. On account of persecution he sought refuge in Massachusetts in 1638, but here had difficulties with the Puritan magistrates. For a time he was pastor of a church at Dover, N. H., but he returned to London in 1641. He attracted a large congregation, but at times he was driven from his post, and fled to the Continent. He died at London, Sept. 19, 1691. He was an accomplished scholar, and a man of fearless, generous spirit. Among his writings are *Flaming Fire in Zion* (1646), some text-books in grammar, and an *Autobiography* (1672), which was completed by Kiffin (1692). The Hanserd Knollys Society, named in his honor, was organized at London in 1845 to republish early Baptist writings.

KNORTZ, Karl, a German-American translator and author, was born at Garbenheim, in Rhenish Prussia, Aug. 28, 1841, and received his education at Wetzlar, London, and Heidelberg. He removed in 1864 to the United States, and became a Unitarian minister. He has published many volumes, chiefly in German, and by his translations of American books has done much to make recent American literature known in Germany. Among his publications are translations of Longfellow's poems, with notes; a collection of North American Indian legends (1871); *American Sketches* (1876); *Longfellow; Studies in Literary History* (1879); *American Shakespeare Bibliography* (1877); and *Representative German Poems* (1885), a collection of German lyrics with English translations.

KNOWLES, James, an English architect and editor, was born in 1831. He was educated at University College, and studied architecture under his father and in Italy. He has executed some of the finest architectural works in London and its vicinity. He has also been much engaged in literary work. In 1860 he compiled from Sir Thomas Malory *The Story of King Arthur*. In 1870 he became editor of the *Contemporary Review*, and by the aid of the Metaphysical Society, which he had organized a short time before, he raised it to an influential position. In 1877 he withdrew and established *The Nineteenth Century*, on the plan, which had already proved successful, of permitting writers of ability to discuss over their own names all questions of public interest.

KNOX, Henry (1750–1806), an American general, was born at Boston, July 25, 1750, his father being a Scotch-Irish Presbyterian, who had for a time resided in the West Indies. He became a bookseller, and being also a militia officer gave considerable attention to military matters. When the American army gathered around Boston in 1775, Knox secretly made his way out to Cambridge, and in the battle of Bunker Hill was a volunteer aid to Gen. Artemas Ward. He was afterwards engaged as an engineer in the siege of Boston. He succeeded Gridley in command of an artillery regiment, and provided means for the bombardment of the city. At New York, also, he had command of the artillery, and was one of the last to leave that city when Washington withdrew. In 1777 he was made by Congress brigadier-general of artillery, and took distinguished part in the battles of Brandywine and Germantown, but the failure at the latter place was chiefly due to his insisting upon an attack on Chew's house, which deranged the plan of battle. His valuable services at Monmouth, June 28, 1778, were acknowledged by Washington in a general order. Knox was a member of the court-martial which tried Maj. André. He was repeatedly sent to New England to secure new troops and means for the campaigns. At Yorktown, in October, 1781, he served with Washington, and soon after was promoted by Congress to the rank of major-general. After the war closed he was placed in command of West Point and had charge of the disbandment of the army. He also arranged with Sir Guy Carleton the terms of surrender of the city of New York. In March, 1785, he became secretary of war, having charge also of the navy, and when Washington was elected President was retained by him in the office. In December, 1795, he retired from the cabinet. He then undertook the improvement of his large estate at St. George's, in Maine. When war with France was threatened in 1798, he was appointed major-general. He died at Thomaston, Me., Oct. 25, 1806.

KNOXVILLE, a city of Tennessee, seat of justice of Knox county, is on the N. W. bank of Holston River, at the head of steam navigation, 165 miles E. of Nashville. Its situation is elevated and beautiful, the surrounding country being noted for its picturesque scenery, good soil, and fine climate. Knoxville is on the East Tennessee, Virginia, and Georgia Railroad, at the junction of the Knoxville and Charleston and the Knoxville and Ohio Railroads. The city has a handsome post-office, 4 large hotels, 2 national and 4 private banks, many churches and schools, 2 daily and 4 weekly newspapers, and an opera house. It is the seat of the University of Tennessee and State Agricultural College. Knoxville is also the seat of the Tennessee School for Deaf-Mutes, and of the Austin Industrial School for Colored Pupils. The public schools are graded and occupy 8 large buildings. The leading manufactures are of iron-goods, such as car-wheels, bars and pigs, nails, castings, machinery, etc., and of lumber, flour, and wooden-wares. The city was founded in 1789, and was named in 1791 after Gen. Henry Knox. It was the scene of important events during the war of 1861–65. It was besieged in 1863 by the Confederates, and was twice assaulted, but was held by Gen. A. E. Burnside until relief came from the Union forces at Chattanooga. The population in 1870 was 8682; in 1880, 10,917.

KNYPHAUSEN, Baron Dodo Henry (1730–1789), a German general, was born in 1730. His father served as a colonel under Marlborough, and the son entered the Prussian army at an early age. Serving in the wars of Frederick the Great against Austria, he rose to the rank of lieutenant-general. In 1776 he was made second in command of the 12,000 Waldeckers and Hessians hired by the British government to fight against the American colonists. He arrived at Long Island in August, and took part in the battles of Long Island, White Plains, Fort Washington, and Brandywine. In 1780, while in temporary command at New York, he made two raids into New Jersey, in which he sacked the village of Connecticut Farms and burnt Springfield. He was a good disciplinarian and was noted for his taciturnity. He died at Berlin, May 2, 1789.

KOALA (*Phascolarctus cinereus*), a very peculiar Australian quadruped, belonging to the Phalanger family of tree-living marsupials (see Phalanger in Encyclopædia Britannica), though with marked divergences from the remainder of the family. In common with the phalangers generally, the koala is marked by having the first toe of the hind feet opposable like a thumb. This toe is set very far back, is large, very broad, and nailless. The second and third toes are considerably smaller and shorter than the others, and are united nearly to their extremities by a common integument. On the fore-feet the koala has the two inner toes considerably shorter than the others, and slightly opposable to them. The nails of all are long, curved, very deep, and much compressed. This formation of the toes gives a grasping power somewhat similar to that of the monkeys, and makes the animal an excellent climber. The koala differs from the other phalangers in the absence of a tail. It is about 2 feet in length and 10 or 11 inches in height, and covered with a dense, woolly fur, moderately soft, and of an ashy-gray color with a brownish tinge. The under parts are of a dirty white hue. The feet are whiteish. The ears are covered by singular tufts of long hair which completely conceal them, and constitute a well-marked peculiarity. The head is rather large, with a short muzzle, which has a naked patch running back 1½ inches on the top and ½ inch on the sides. The marsupial pouch is well developed. There is but one species in the genus, the generic name signifying "pouched bear." The animal, indeed, looks something like a small bear, and has bear-like movements and mode of climbing. It has been called the Australian bear for this reason.

The koala is nocturnal in its habits and a vegetable-feeder, its favorite food being the tender shoots of the blue gum-tree. During the day it rests in the tree-tops, feeding or sleeping, but at night it descends to the ground and prowls about, probably in search of some favorite root. On the ground it seems to creep rather than walk, carrying its young upon its back. It is an inactive creature, moving with great deliberation, and does not, like quadrupeds generally, seek to fly from man. It is very tenacious of life, and when severely wounded will cling to the branch. In this respect its habits resemble those of the sloth, since it clings to and suspends itself from the limbs in the manner of the latter. The koala is only found in South-east Australia, and is not very frequently seen, even in its favorite localities. It is hunted by the natives, with whom it is a favorite food, and who climb the loftiest gum-trees in its pursuit. They follow it to the extremity of the branches, and either kill it with a blow or take it alive. It is gentle in character, and yields to capture with little resistance, seeming to form an attachment to the person who feeds it. Yet it is liable to sudden and unexpected bursts of passion, in which it utters a long, shrill yell, and puts on a fierce and menacing look. Its ordinary voice is a peculiar soft bark.

KOBELL, Franz Von (1803–1882), a German mineralogist and poet, was born at Munich, July 19, 1803. He became professor of mineralogy in the university there in 1834. Besides many popular treatises on mineralogy, he prepared most valuable history of that science from 1650 to 1860, as part of the elaborate *Geschichte der Wissenschaften in Deutschland* (1864), projected and patronized by King Maximilian of Bavaria. He did much to improve the methods of examining and classifying crystals and minerals. Kobell also published *Hochdeutsche Gedichte* (1852); *Die Urzeit der Erde* (1856); and many dialect poems which have been widely circulated in Germany. He died at Munich, Nov. 11, 1882.

KOLLAR, Jan (1793–1852), a Slavic poet, was born at Mossocoz, in North-west Hungary, July 29, 1793. He was educated at Presburg and Jena, and in 1819 became minister of a Slavic Evangelical congregation at Pesth. In 1849 he was made professor of Slavic archæology in the University of Vienna. His poems, written chiefly in the Czech language, had a powerful influence in developing the spirit of his race. Still more effectual were his labors in behalf of Panslavism, which indeed gives the key to all his works. His most celebrated poem is *Slavy dcera* (1830). In his treatise *Über die literarische Wechselseitigkeit zwischen den Stämmen und Mundarten der Slawischen Nationen* (1831) he advocates the use of a common Slavic literary language, as the basis of union of the various branches of the race. He died at Vienna, Jan. 29, 1852. His complete works were published at Prague (4 vols., 1860–65).

KOLLIKER, Rudolf Albrecht, a German physiologist, was born at Zurich, July 6, 1817. He was educated at the university of that city, and in 1839 went to Bonn, and soon after to Berlin. Here he entered upon microscopic investigations which gave him extensive fame. In 1842 he was appointed an instructor in the University of Zurich, and in 1845 was made assistant professor of physiology and comparative anatomy. In 1847 he was called to the same position at Würzburg, and in 1849 was made professor of anatomy there. He assisted in founding a medico-physical society here, and has contributed frequently to the scientific periodicals. His works on histology, physiology, and other branches of biology are acknowledged as standards, and have been translated into the principal European languages. Among them are *Mikroskopische Anatomie* (2 vols., 1850–54); *Handbuch der Gewebelehre des Menschen* (1852); *Icones Histologicæ* (2 vols., 1864–65); *Grundriss der Entwickelungsgeschichte* (1880).

KOSSUTH, Louis, a Hungarian patriot, was born at Monok, April 27, 1802. He is of Slavic descent, and his family belonged to the Lutheran Church, his father being a lawyer. Louis (or Lajos in Hungarian), the only son, was educated at the gymnasium of the Piarists at Ujhely, and afterwards studied law and philosophy at the Protestant College of Scharosehpatak, where he displayed remarkable facility in the acquisition of languages. In 1826 he entered upon the practice of his profession as a lawyer and for a time was manager of the estate of Countess Szapary. He was popular with the lower classes, and from 1832 to 1836 he sat in the National Assembly as the proxy of a magnate or member of the Upper House. As the proceedings of this assembly were of great interest to those who had sympathized with the Polish Revolution of 1831, and the government had prohibited the publication of reports of the debates, Kossuth dictated to a large number of copyists extracts with comments, which were extensively circulated. Afterwards he undertook to publish a lithographed paper at Pesth, but the government prohibited its issue. Although favored by the county of Pesth Kossuth and other liberals were arrested May 2, 1837, tried for high treason, and condemned to four years' imprisonent. At the next election the liberals, roused by this outrage, returned a majority to the diet, and there refused to grant supplies to the government unless the prisoners were released. Foreign complications also assisted their cause and after a confinement of eighteen months they recovered their freedom. On Jan. 1, 1841, Kossuth became chief editor of the *Hirlap*, a journal published at Pesth, and through its columns for three years worked for the elevation of Hungarian nationality. Unable to procure the necessary license for a new paper he contributed occasional articles to a weekly industrial journal, and encouraged the organization of local societies for agricultural, commercial, and industrial purposes, and a protection union, designed to stimulate the use of domestic manufactures. In 1847 elected to the house of deputies, he soon became its leader, and in March, 1848, he carried to Vienna an address to the Emperor Ferdinand, asking for the restoration of independence to Hungary and a constitution for the whole Empire. Metternich had fled and the emperor directed Count Louis Batthyanyi to form an independent Hungarian ministry. Here Kossuth held the department of finance. The diet of Presburg closed April 11, 1848, and a national assembly having convened at Pesth, Kossuth not only gave the form to the new government, but by his public addresses and through the newspapers breathed into it the breath of life. For the events of the revolutionary war of 1848–49 the reader is referred to the article on HUNGARY in the ENCYCLOPÆDIA BRITANNICA. The refusal of Gen. Görgei to lead his army beyond the limits of Hungary enabled Austria to recover from her defeats, and the intervention of Russia brought about the downfall of the Republic of Hungary. Kossuth, who had been dictator under the name of governor from April to August, 1849, resigned his power and fled with other revolutionary leaders into Turkey. He was sent by the Turkish government to Kutaieh, in Asia Minor, and though his extradition was demanded by Austria and Russia, he was on the request of the United States and England allowed to depart with his family, who had followed him from Hungary. During his stay in Asia he had assiduously studied modern languages, and acquired fluency in speaking in English, French, German and Italian. In September, 1851, he embarked on the U. S. war-steamer Mississippi, which had been sent to convey him from Asia. After arriving at Southampton, England, he visited the principal cities of Great Britain, and addressed large audiences in behalf of Hungarian independence. He made a similar tour in the principal cities of the United States, but the overthrow of the French Republic by Louis Napoleon's *coup d'état* prevented any practical success in his efforts. A large portion of the American people, however, manifested in every possible way their sympathy with his misfortunes, but the government wisely refrained from committing itself to his cause. Returning to Europe in July, 1852, Kossuth took up his residence at London. While delivering lectures on Hungarian history and other subjects he was also engaged with Mazzini and Ledru-Rollin in the diffusion of democratic principles on the Continent. At the commencement of the Italian war of 1859 he renewed his efforts in behalf of Hungary, and for a time believed he had the support of Napoleon III., but the peace of Villafranca doomed him to disappointment. In 1862 he removed to Turin, where he has since resided. During the German war of 1866 he issued a proclamation to the Hungarians, calling them to action, and he afterwards expressed his disapproval of the reconstruction of Austria-Hungary. Under the new constitution he was several times elected to the diet of Pesth, but refused even to return to Hungary. In 1870 he appealed to the United States to interfere in favor of peace between France and Germany. For many years he has devoted much time to scientific pursuits, and has published some papers. Several collections of his speeches have been made, and his writings have been published in the *Europäische Bibliothek* (1860–70). His *Autobiography* appeared in 1883.

KRASINSKI, VALERIAN, COUNT (*c.* 1780–1855), a Polish historian, was born in White Russia about 1780. Early employed in the civil service, he became minister of public instruction, and having introduced stereotype printing into Poland assisted in diffusing useful literature. The provisory government established at Warsaw in 1830 sent him on an embassy to England, and the failure of the Revolution compelled him to remain there. He then devoted himself to literature, residing first at London and afterwards at Edinburgh, where he died Dec. 22, 1855. His chief publications were *The Rise, Progress, and Decline of the Reformation in Poland* (2 vols., 1839–40); and *Religious History of the Slavonian Nations* (1851).

KRASINSKI, ZYGMUNT NAPOLEON, COUNT (1812–1859), a Polish author, was born at Paris, Feb. 19, 1812, being the son of Count Vincent Krasinski, who held a high position in the Russian army. The son having refused to serve in it, lived at various European capitals, and published many volumes of poetry, inspired by his devotion to his country. He died at Paris, Feb. 24, 1859. A collected edition of his works appeared at Leipsic in 1863. Among his most noted works are *Kieboska Komedya*, which furnished the substance of Owen Meredith's *Fool of Time*, and *Psalmyprzyszlosci*.

KRAUTH, CHARLES PORTERFIELD (1823–1883), an American theologian, was born at Martinsburg, Va., March 17, 1823, being the son of Rev. Charles Philip Krauth, D. D. (1777–1867), who was president of Pennsylvania College, Gettysburg, from 1834 to 1847. The son graduated at this college in 1839, and was ordained in the Lutheran ministry in 1842. He had charge of churches in Baltimore, Winchester, Va., and Pittsburg. In 1852 he went to the West Indies and spent three months in the island of St. Thomas. He became pastor of St. Mark's Lutheran Church, Philadelphia, in 1859, and in 1861 added to his duties the editorial care of the *Lutheran and Missionary.* In 1864 he resigned his pastorate to become professor of systematic theology and church polity in the Lutheran Theological Seminary, Philadelphia. In 1868 he was chosen professor of intellectual and moral philosophy in the University of Pennsylvania, and in 1873 was made vice-provost of that institution. For three successive terms he was president of the General Council of the Lutheran Church in America. His influence on the polity of that denomination was very great. He died at Philadelphia, Jan. 2, 1883. His chief work is *The Conservative Reformation and its Theology* (1871), an admirable history and an able defence of the Lutheran Church. He edited Fleming's *Vocabulary of Philosophy* and *Berkeley's Principles of Knowledge.*

KRUPP, FRIEDRICH, a German iron-worker of world-wide fame, was born at Essen, in Westphalia, in 1812. His father died when he was 14 years of age, leaving a small iron-forge shop to support him and his mother. The widow gave her son a good education, and the two managed the shop until it was taken over by Friedrich on his own account in 1848. The progress of the works from this time on is marvellous. In 1860 the total number of workmen employed by Krupp was 1764. This had increased by 1870 to 7084, and now the total number exceeds 20,000, and if we add the women and children dependent upon the workmen, the number of persons supported by Herr Krupp is not less than 66,000, and of this number fully 29,000 dwell in cottages built by him and belonging to his works.

There are eight separate and distinct departments belonging to Krupp's immense concern: 1. The vast extent of the works at Essen. 2. Three coal mines at Essen and Bochum. 3. No fewer than 547 iron ore mines in various parts of Germany. 4. Several iron mines near Bilbao, in Spain. 5. An extensive series of smelting furnaces. 6. The ranges at Meppen for the trials of the guns. 7. Branch works at Nerdweid. 8. Branch works at Sayn. Besides the smelting furnaces there are 1842 puddling and heating furnaces. The number of steam-boilers employed in Herr Krupp's works is 439, and the total indicated horse-power of the 450 steam-engines is 185,000. There are 42 miles of railroad in the works, and the traffic is performed by 88 locomotive engines and 893 freight cars. There are now no fewer than 35 telegraph stations, 40 miles of telegraph wire, and 55 Morse instruments in operation in the works. In addition to manufacturing great guns and projectiles, rails, tires, wheels, and all parts of engines, and, in fact, steel work of all descriptions are prepared here. Crucible steel only is used in the manufacture of the Krupp guns. At one time the guns were made of single cast-steel ingots forged and turned; but this method has been abandoned, and now the guns are all "built up" by shrinking hoops of steel over a central tube with initial tension. There is a single layer of hoops around the tube for guns below 9-inch calibre, while the 9-inch and upwards have two layers of hoops protecting the after parts. The tubes and hoops are forged without weld. The chambers of the guns are slightly larger than the bores. The rifling is uniform, with shallow grooves widening slightly toward the breech.

KÜCKEN, Friedrich Wilhelm (1810–1882) a German musical composer, was born at Bleckede, Luneburg, Nov. 16, 1810. His youthful compositions having attracted notice, he was sent to Berlin with the son of the grand-duke of Schwerin. There he published his first opera, *Die Flucht nach der Schweiz*, which proved successful. He lived for some time at Hanover, and afterward at Vienna, where he enjoyed great popularity. In 1843 he went to Paris and received instruction from Halévy. Here he composed his opera *Le Prétendant*, and wrote music to the words of Heine. After visiting various capitals he was made chapel-master to the king of Würtemberg. In 1861 he returned to Schwerin, where he died, April 3, 1882. Many of his works were gathered in *Les Échos de l'Allemagne* (Paris, 1856) and *Friedenhymne* (1871). They are especially noted for the sweetness of their melody.

KUENEN, Abraham, a Dutch theologian, was born at Harlem, Holland, Sept. 16, 1828. He studied theology at Leyden, in 1853 was made professor extraordinary of theology there, and in 1855 he became professor. He has devoted himself chiefly to Old Testament criticism and to investigation of Israelitish worship. His first publications were *Liber Geneseos* (1851) and *Libri Exodi et Levitici* (1854), based on an Arabic version of the Samaritan Pentateuch. In his much more original *Historico-critical Investigation of the Origin and Collection of the Books of the Old Covenant* (3 vols., 1861–65) he broke away completely from the traditional beliefs with regard to the Old Testament. His criticism was searching and sceptical, and the results provoked an extended controversy. Then followed his *Worship of Israel till the Overthrow of the Jewish State* (2 vols., 1869–70), *Prophets and Prophecy in Israel* (2 vols., 1875). In 1881 he delivered in London the Hibbert lecture on *National Religions and Universal Religions* (London, 1882). Since 1867 he has edited the *Theologisch Tijdschrift.*

KÜHNER, Rafael (1802–1878), a German philologist, was born at Gotha, March 22, 1802. From the gymnasium of his native town he passed to the University of Göttingen, where he studied philology. In 1825 he became a teacher in the lyceum at Hanover and devoted himself chiefly to the Greek language and Cicero. In his *Ausführliches Grammatik der griechischen Sprache* (2 vols., 1834–35) he introduced the results of comparative philology and rearranged the syntax on scientific principles. This grammar marks a new epoch in the teaching of Greek. The *Elementary Grammar* (1837), founded on it, has passed through more than thirty editions in Germany, while translations and adaptations of it have been widely used in England and America. Kühner's *Elementary Grammar of the Latin Language* (1841) had similar success. He also published manuals of Greek and Latin composition and *Ausführliche Grammatik der lateinischen Sprache* (2 vols., 1877–79). He died at Hanover, April 16, 1878.

KUNG-CHIN-WANG, known as Prince Kung, a Chinese statesman, was born Jan. 11, 1833. He is brother of Hin-fung, who was emperor of China from 1850 to 1861. To Prince Kung was intrusted the charge of the negotiations with the European powers in 1860 which resulted in the treaty of Tien-Tsin. When a ministry of foreign affairs was created in March, 1861, he was appointed to the office, and in July, when Hin-Fung died, Prince Kung became one of the regents, the emperor, Tung-Che, being only 7 years old. The attempts made to reduce his power to insignificance were overcome, and in November, 1861, the chiefs of the opposition were condemned to death. During the Taiping rebellion he availed himself of the assistance of foreigners for its suppression. He steadily endeavored to introduce the ideas, methods, and inventions of modern European civilization, and in spite of many hindrances has been largely successful in so doing. In 1866, and again in 1869, he went on special embassies to America and Europe. In 1874, when he concluded peace with Japan after the Formosan troubles, he was accused of having yielded te foreign influence, and was condemned to death, but on the next day was restored to his office and dignities by imperial decree. After the death of Tung-Che, in 1875, Prince Kung continued prime minister, the throne being occupied by Tsai-Tien, or Kwang-Seu, who was born in 1871. In the difficulties with France, in 1883–84, Prince Kung's conduct again gave his enemies an opportunity to drive him from power.

KUNZE, John Christopher (1744–1807), an American clergyman, was born at Artern, Prussian Saxony, Aug. 4, 1744. He studied theology at Leipsic, and engaged in teaching until 1770, when he accepted a call as associate pastor in German Lutheran congregations in Philadelphia. In the next year he married the daughter of the rector, Rev. H. M. Muhlenberg, D. D., and in 1779 he succeeded to the rectorship. Although the Revolutionary war embarrassed his efforts, yet he accomplished much good for his church and the community. In 1784 he removed to New York, where he was pastor of a congregation and professor in the New York University, which he had assisted in founding. He died at New York, July 24, 1807. He published the first English Lutheran hymn book ever issued, a *History of the Christian Religion*, and some sermons.

KURTZ, Benjamin (1795–1865), an American clergyman, was born at Harrisburg, Pa., Feb. 28, 1795 He belonged to a family which had furnished several ministers to the Lutheran Church. He was licensed to preach in 1815, and became assistant to his uncle, Rev. J. D. Kurtz, D. D., pastor in Baltimore. He was afterwards pastor at Hagerstown, Md., and at Chambersburg, Pa., but in 1833 he returned to Baltimore to edit the *Lutheran Observer*, which became the leading organ of that denomination. He also took a prominent part in founding the Gettysburg Theological Seminary, and spent two years (1825–27) in Germany securing aid for it. He was a manager of the Lutheran Book Company in Baltimore and of the Missionary Institute at Selinsgrove, Pa. He retired from editorial work in 1862 and died at Baltimore, Dec. 29, 1865. He published a *Theological Sketch Book* and *Prayer in all its Forms* (1852).

L.

LABICHE, Eugène Marin, a French dramatist, was born at Paris, May 5, 1815. He was educated at the Collège Bourbon and studied law, but soon began to write short stories for the Paris papers. After publishing *La Clef des Champs* (1838) he turned his attention to vaudevilles, and soon became noted by his success in adapting his productions to particular comedians. They are full of absurd situations and laughable entanglements and provoked curiosity by odd titles. Afterwards he attempted higher comedy with considerable success. Among his noted pieces are *Le Voyage de M. Perrichon* (1860); *La Poudre aux Yeux* (1861); *Les Petits Oiseaux* (1862); *Le Choix d'un gendre* (1869). He began to publish a complete edition of his works in 1878.

LABOR. The term "labor question" is a modern

See Vol. XIV. p. 166 Am. ed. (p. 165 Edin. ed.).

concrete expression, used to represent the demands which the employed may make of employers. It belongs entirely to the present system of industry, and is to be understood only from a full consideration of industrial conditions. In the middle of this century it simply stood for the demand for less hours or more pay. As intelligence has increased, as machinery has been developed, as labor has been more and more sub-divided, as hygienic and physical conditions have improved, the phases and ramifications of the labor question have increased proportionately, until to-day it stands for all the elements involved in the industrial system. It is a short term for the evolution of industrial forces, and includes a wide range of sociological studies. It embraces the wants of the wage-laborer, and such wants comprehend the discussion of the just and equitable distribution of profits or the products of labor and capital. It is in this latter sense that the vital elements of the labor question, whether from an economical or ethical point of view, may be found, for the just distribution of profits can best be discussed on grounds covering both economics and ethics, for it is now recognized that justice and equity are involved in the consideration of such distribution. It is true that a just distribution of profits, by which support and provision for old age may be secured, as well as passing support, depends much more upon the cost of living, habits of frugality, temperance, good morals, sanitary conditions, educational privileges, and various forces of a moral nature, than upon purely economical conditions. The labor question must be discussed on a broad and comprehensive basis, not merely on economic grounds.

The age has been one of material progress. Economics have ruled almost at the expense of ethics, notwithstanding the age has seen wonderful structures of charitable and educational design grow into existence. The strides civilization has made command our admiration, and its onward steps are marked by numerous and convincing evidences, but such evidences are outside of economics and are only considered by the economist as the cost may enter into the distribution of the wealth it seeks to create, and not as a means for a better and happier condition wherein wealth could be more successfully produced. It is, therefore, legitimate to consider the labor question, if not the most important, at least one of paramount importance to any question which commands public attention. The welfare of the wage-worker is enhanced by all those efforts which seek to ameliorate miserable conditions surrounding any portion of the human race; which seek to prevent crime, to increase temperate habits, to foster moral and religious growth, to procure the best hygienic and sanitary environment, to increase the opportunities for mental and social culture, to preserve the integrity of the family, to build up manhood suffrage, to strengthen the political structure, to elevate individual character—in fact, to secure the highest conditions, in all respects, of the human race. The labor question to-day and social science are nearly, if not fully, synonymous terms. It is the broadened intelligence of the wage-workers which has enlarged their demands to such proportions that their demands are made not only upon their employers but upon legislatures and the whole body politic. Under the feudal system the laborer was cared for in all his physical wants by the feudal lord. Under the succeeding or wage system the wage-worker has been left to care for himself. Theoretically, his wages are paid according to his capacity and not his wants. Practically, under competition, his wages are paid too much in accordance with his necessitous wants, and not sufficiently in accordance with his capacity. In this last respect we find the origin of the labor question. What has been said applies to the wage-workers of all countries in which the modern industrial system has made any considerable progress, and it is substantially the same in all its phases in all such countries. It has nothing, however, to do, as the labor question, with nihilism, with communism, or with socialism, although all three of these philosophies take on many of the subdivisions or phases of the labor question, and to many there is consequently a confusion of ideas connecting the one with the others, and all forming the same general question. The workingmen of America have no occasion to be nihilists, nor communists, nor socialists, although, were all their demands accorded to them, our American governments would find themselves more thoroughly on a socialistic basis than that on which they now rest. The purely wage-workers in the United States—that is, those who work for established wages or small salaries—constitute in round numbers at least 15,000,000, or three-tenths of the whole population, the average income of the wage-worker not exceeding $400 per annum. This body is represented in sex as about five males to one female. Any great depression in employment, by stagnation of works, cessation of railroad building, crippled consumption, must throw out of employment a large body of people, bringing with the cessation of labor an enormous loss to the consuming power of the country, such loss being reflected upon all industries. A general reduction in wages at any time produces a similar result. In the economic sense it is evident that the best paid conditions of labor mean the best results to the whole country. Again, if a large proportion of this great body of workers is subsisting on a low consumption of products, the raising of their consumptive power means an enhancement of industrial prosperity. Better moral conditions, by increasing the wants of a people, elevating luxuries, or what would have been considered luxuries in the past to necessities in the present or future, which is the result of general increased educational advantages, must be met with increased compensation or decreased cost, in order to enable the body of workers to meet the actual wants surrounding them. Increased intelligence, therefore, involves increased demands, and the consequent and constant enlargement of the labor question. This enlargement of the question has brought with it powerful labor organizations. For many years past labor organizations have existed among different trades or industries, each organization involving the workers in a particular industry in a particular locality. With such organizations there was no cohesive power, and they could have, under the circumstances, but little influence. The first great attempt to bring all workers into harmonious relations through one powerful organization was in the institution of the body known as Internationals, an organization undertaking to comprehend the wage-workers of all the countries that had carried mechanical production to any great extent; but the Internationals did not succeed because the sentiments of the workers in different countries could not be amalgamated, and because finally it found itself allied not only with revolutionary socialism but with communism and nihilism. The American wage-workers took but little interest in the organization and work of the Internationals, but have of recent years built up a powerful organization known as the Knights of Labor. This body comprehends the intelligence of the wage-workers of the United States, and while other countries are incidentally involved it can be considered an American institution. Its leaders are able men, comprehending the labor question in its entirety, and seeking to bring about, by legitimate propaganda, the highest results. Organized on a basis which appeals to the sympathy of the public, the order has grown not only in proportions but in influence, and its platform to-day must be taken as standing for the crystallized elements of the labor question. This platform, which was adopted at Philadelphia in September, 1884, proclaims as the tenets of the order its desire to make industrial and moral worth, not wealth, the true standard of individual and national greatness; to secure to workers the full enjoyment of the wealth they create, sufficient leisure in which to develop their intellectual, moral, and social faculties, and all the benefits, recreation, and pleasures of association, and to enable them to share in the gains and honors of advancing civilization. In order to secure these results the Knights of Labor demand, at the hands of the individual States, the establishment of bureaus of labor, that they may arrive at a correct knowledge of the educational, moral, and financial condition of the laboring masses; that public lands be reserved for actual settlers; that no more grants be made to railroads or speculators, and that all lands now held for speculative purposes be taxed to their full value. They demand the abrogation of all laws that do not bear equally upon capital and labor, and the removal of unjust legal technicalities, delays, and discriminations in the administration of justice. They also ask for the adoption of measures providing for the health and safety of those engaged in mining, manufacturing, and building industries, and an indemnification for injuries received through lack of necessary safeguards; also the recognition, by incorporation, of trades-unions, orders, and such associations as may be organized by the working masses to improve their condition and to protect their rights. They demand frequent payments in lawful money, and the right of a mechanic to a first lien upon the product of his labor to the extent of his wages in full. They also ask legislation which shall abolish the contract system on State, national, and municipal works; which shall provide for arbitration between employers and employed; which shall prohibit the employment of children in workshops, mines, and factories, and the hiring out of convict labor. They also ask that a graduated income-tax be instituted. They demand, at the hands of Congress, the establishment of a national monetary system, under which circulation shall be secured without the intervention of banks, and that the government shall meet all financial emergencies by the issue of legal-tender, non-interest-bearing money. They protest against the importation of foreign labor under contract. They ask the establishment of post-office savings banks, and that government shall obtain possession by purchase, under the right of eminent domain, of all business relating to transportation of passengers, freight, or intelligence. They pledge their own endeavors to secure the introduction of a co-operative industrial system which shall in time supersede the wage system; to secure equal pay for both sexes for equal work; to shorten the hours of labor; and to persuade employers to agree to arbitrate all differences which may arise between them and their employés, in order that the bonds of sympathy between the employer and the employed may be strengthened, and that strikes may be rendered unnecessary.

Such, in brief, are the demands and pledges of the Knights of Labor, and certainly they embrace broad and comprehensive features. They recognize the fact that their demands can never be met through revolutionary proceedings, but, in the language of their chief, that while they must, in seeking reforms, in some instances use the ballot-box, yet the highest motive that concerns them is the education of the masses to that point where they will fully see and know not only their own wrongs and degradation but a full and final solution of the labor problem; that success will be evolved slowly and almost imperceptibly; and he recognizes that such evolution must come through organization and education, which he calls the silver lining of the cloud that lowers above them. Most men can indorse the aims of the wage-workers of America as represented in the platform referred to. Local difficulties, individual cases of hardship, even of wrong, constantly occur; but the principles of right, as between man and man, must eventually prevail. It is very evident that the labor question will attract still greater attention as the insufficiency of the wage system becomes more and more apparent. However great an improvement it might have been on the system which preceded it, the progress of our industries has been so great that its modification will become a necessity, and a necessity not to one side of the industrial question alone but to all interested. Labor organizations will grow more and more complete and absorbing, and along with them organizations of the employer class will become more thoroughly perfected. The inevitable result must be the treatment of particular matters of dispute by representative bodies, and the reduction of manufacturing to a scientific basis, by which so-called over-production will be avoided and a more equal employment of labor secured. Legislation can do but little; public sentiment can accomplish much. The American socialism, which grows out of the principles which have settled all the great difficulties so far which have arisen here, is the recognition of human rights, and the adjustment of labor difficulties must rest upon the same recognition. With the industries of all the great producing countries overcrowded, not only as to the productive capacity of the works themselves but the human productive capacity, the labor question must be considered on the broadest basis and in a fairly conservative temper. It must be assumed that wage-workers are interested in the preservation and extension of all industrial forces or of all implements of industry, and that the employer class, while seeking the preservation of such forces, will seek the highest general conditions of the workers themselves. The full recognition of the absolutely powerless single force must secure the vitality of its fellow. Temporarily this may be lost sight of, and one force or the other feel that it can vitalize industry alone; but such a chaotic result cannot long continue, and each, recognizing the necessity of the other, must sooner or later recognize its fullest rights also, and be willing to secure the most intelligent freedom consistent with safety that can come to each great factor of industry. When the wage-worker is as free to make contracts for his labor as the employer is to make contracts for products, very many of the phases of the present labor question will drop out of sight. What other phases will take their place depends upon the intelligence with which those of to-day are considered and adjusted.

The literature of the labor question is very voluminous. Some of the economists have taught the elements of the question on a broad and comprehensive basis. See the writings of Louis Reybaud and F. Le Play, of France, and Prof. Emile de Laveleye, of Belgium. English works are well represented by Thorold Rogers' *History of Wages and Prices* and *Six Centuries of Work and Wages; Thornton on Labor;* Howells' *Conflict of Labor and Capital;* Holyoake's *History of Co-operation;* Sir Henry S. Maine's works; *The Reign of Law*, by the Duke of Argyle; Wade's *History of the Working Classes;* the speeches of the Earl of Shaftesbury; Brassey's *Foreign Work and English Wages;* Sedley Taylor on *Profit-Sharing;* Jevons' *The State in Relation to Labor*, and many others. For American books the student of the labor question should consult the publications of the various bureaus of statistics of labor, namely, of Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Ohio, Illinois, Indiana, Michigan, Iowa, Wisconsin, Missouri, Kansas, California, and the United States Bureau of Labor; the publications of the State Department at Washington on labor in Europe and America; the consular reports; Weeks' *Report on Wages;* Wright's *Report on Factory System*, for the tenth census; the writings of Gen. F. A. Walker, especially his work on *Wages;* Prof. R. E. Thompson's economic writings; William B. Weeden's *Social Law of Labor;* Prof. A. S. Bolles' *Conflict of Labor and Capital; The Distribution of Products*, by Edward Atkinson, etc., etc.

Labor's contribution to romance is found in Charles Kingsley's *Yeast, Alton Locke*, and other stories; Charles Reade's *Put Yourself in His Place* and *Never too Late to Mend;* Dickens' *Hard Times;* Disraeli's *Sybil;* Black's *Sunrise;* Victor Hugo's *Les Miserables; The Stillwater Tragedy*, by T. B. Aldrich; *The Breadwinners*, etc. In biography the lives of George Stephenson, James Nasmyth, and Thomas Brassey offer instructive reading. In the United States there are about one hundred labor publications, and the number is constantly increasing. The lack of works is in the direction of those written from the ranks of labor itself.

(C. D. W.)

LABORDE, ALEXANDER LOUIS JOSEPH, COMTE DE (1774–1842), a French archæologist, was born at Paris, Sept. 15, 1774, being the son of Marquis Jean Joseph de Laborde (1724–1794), a French financier and friend of Voltaire, who was guillotined in the Revolution. The son had been sent to Vienna and there entered the Austrian army, but in 1797 returned to France. In 1800 he went with Lucien Bonaparte to Spain, and spent two years in explorations which were the foundation of his learned and magnificent work, *Voyage pittoresque et historique de l' Espagne* (4 vols., 1807–1818). Though its publication cost him immense sums of money he was not deterred from publishing other expensive works, among which are *Les monuments de la France* (1816–26); *Voyage pittoresque en Autriche* (3 vols., 1821–23); and *Versailles, ancien et modern* (1839–40). He took part in the Revolution of 1830, and afterwards held office under Louis Philippe. He died at Paris, Oct. 24, 1842.

LABORDE, LÉON EMMANUEL SIMON JOSEPH, COMTE DE (1807–1869), a French archæologist, son of the preceding, was born at Paris, June, 1807. He was educated at Paris and Göttingen, travelled in the East, and after publishing an account of his visit to Arabia issued in parts a costly work, *Voyage en Orient* (1837–1862). He held several diplomatic positions, and in 1841 he was elected to the chamber of deputies. In 1845 he began to publish investigations of the public libraries, and in 1846 *Les anciens monuments de Paris.* The latter and several other works were left incomplete. He was curator of the antiquities at the Louvre for some years, and after 1857 director of the archives of the Empire. He died at Paris, March 30, 1869.

LABOUCHERE, HENRY DU PRÉ, an English journalist, was born at London in 1831, being a nephew of Henry Labouchere, Baron Taunton (1798–1869). He was educated at Eton and entered the diplomatic service, being attaché successively at Washington, Munich, Stockholm, Frankfort, St. Petersburg, and Dresden. He was promoted to be second secretary at Constantinople in 1863, and resigned in 1864. He entered Parliament as representative for Windsor in 1865, but was unseated on petition in the next year. He was elected for Middlesex in 1867, but in 1868 went abroad. During the siege of Paris he remained in the city, and by means of carrier pigeons kept up a correspondence with the London *Daily News.* His letters were afterwards published as the *Diary of a Besieged Resident in Paris* (1871). After further travel and adventures Labouchere returned to England and was elected to Parliament for Northampton in 1880. He also established a journal called *Truth*, in which he used his wide experience of life and society to give piquancy to his personal remarks.

LABOULAYE, EDOUARD RENÉ LEFÉBVRE (1811–1883), a French author, was born at Paris, Jan. 18, 1811. While engaged as a typefounder he studied law, and became known by his *Histoire du droit de propriété foncière en Europe depuis Constantin jusqu' à nos jours* (1839), which was crowned by the Academy of Inscriptions. In 1842 he became an advocate of the royal court of Paris, but he continued to devote attention to literature. After an essay on Savigny (1842) he published *Recherches sur la condition civile et politique des femmes depuis les Romains jusqu' à nos jours* (1843) and *Essai sur les lois criminelles des Romains concernant la Responsibilité des magistrats* (1845). He was now a member of the Academy of Inscriptions, and in 1849 was made professor of comparative legislation in the Collège de France. He was a liberal Republican, an ardent admirer of American institutions, and a firm friend of the North during the civil war. Under the Empire his political activity was confined to his writings and speeches, which were not without effect in preparing the way for the new Republic. While he constantly held up the American government as a model for French imitation, he also rendered immense service to the cause of the American Union by his work, *Les États-Unis et la France* (1862), in which he set forth the causes of the civil war. Elected in 1871 to the National Assembly, he took part especially in matters relating to public instruction, and in 1874 he was secretary of the committee on the constitution. His political occupations compelled him for some years to leave the duties of his professorship to a substitute, yet his colleagues thrice elected him director of the college. Laboulaye was an active supporter of Pres. Thiers, and after the reactionary movement had transferred the presidency to MacMahon he became the leader of the Left Centre. In December, 1875, he was chosen a senator for life, and in the upper house maintained firmly the same liberal yet independent attitude. At this time he was appropriately made president of the French-American committee for the celebration of the centenary of American independence. His moderation was conspicuously shown in the discussions on religious instruction in France. The tone of all his writings and speeches was cheerful and hopeful, and he lived to see much of what he had advocated prevailing and accepted in his country. He died at Paris, May 25, 1883.

Besides the works already mentioned Laboulaye published *Histoire politique des États Unis* (3 vols., 1855–65); *La Liberté religieuse* (1856); *L' État et ses Limites* (1863); *Lettres politiques* (1872). He also translated from English the principal works of Channing and the *Memoirs and Correspondence* of Franklin. In his *Paris en Amérique* (1863) prominent features of American and French social and political customs are mingled in highly picturesque fashion. Another lively romance was *Le Prince Caniche* (1868). In his *Contes bleus* (1863) and some later publications he showed an admirable faculty in writing for children.

LACHES (Fr. *lacher*), a legal term signifying delay or negligence. Where a remedy is discretionary and not compulsory, *laches* on the part of the person seeking to enforce the remedy will prejudice and sometimes defeat his case. In courts of equity delay is particularly dangerous, the maxim being, "Equity aids the vigilant and not the indolent." *Laches* will, however, be excused where the party is laboring under a legal disability, as insanity, coverture (a woman being married and under the control of her husband having no right to sue in her own name, etc.), infancy (the party not having attained majority), and the like. No laches can be imputed to the state.

LACROIX, PAUL (1807–1884), a French author, was born at Paris, Feb. 27, 1807. He was educated at the Collège Bourbon, and gave himself to historical research. His first work of note was *Histoire du seizième siècle en France* (4 vols., 1834–35). Then, after some minor historical essays, he wrote with great rapidity, under the pseudonym of "Le bibliophile Jacob," a number of historical novels. He was also editor of and contributor to many periodicals, and published many historical and bibliographical works. His chief production is *Le Moyen Age et la Renaissance* (5 vols., 1847–51), carefully illustrated from monuments and documents of the time. This was reissued, enlarged, and improved (4 vols., 1868–76), and has been translated into English. His last historical work is *Le dix-huitième Siècle* (1875). Though possessing great erudition, he wrote too much. He died Oct. 16, 1884.

His wife, **APPOLINE BIFFE**, wrote *Fleur de serre et fleur des champs* (1854); *Madame Berthe* (1857); and some other novels. His brother, **JULES LACROIX** (born May 7, 1809), translated into French Shakespeare's *Macbeth* (1830); Sophocles' *Œdipus Rex* (1858); and some other works. His novels are of less account.

LA CROSSE, a city of Wisconsin, county-seat of La Crosse county, is pleasantly situated on the Mississippi River, opposite La Crescent, Minn. It is near the mouth of the Black River, and at the mouth of La Crosse River, 195 miles by rail W. N. W. of Milwaukee. The Black River brings down many logs by flotation, and thus renders La Crosse an important distributing point for lumber. Six trunk lines of railway, operated by 3 companies, centre at this town. The city stands on a sandy tract, and is spread over a large area; and most of the houses are built in gardens. La Crosse has 25 churches (one of them the cathedral of the Roman Catholic diocese of La Crosse), a handsome court-house, a high-school, a system of graded public schools, 8 private and parochial schools, 5 newspapers (3 daily), 20 hotels, gas-works, 2 hospitals, a convent, an orphanage, a public library, 4 banks (2 national), a board of trade, and manufactures of lumber, machinery, boilers, beer, farming-tools, cigars, soap, flour, jewelry, hardware, sash, blinds, and builders' mill-work, trunks, confectionery, pumps, castings, leather, and other goods. Large amounts of grain and country produce are shipped by rail and river. La Crosse became a city in 1856. Population in 1870, 7785; in 1880, 14,505; a private enumeration in 1884 gave the town 23,549 inhabitants.

LA FARGE, JOHN, an American artist, was born at New York about 1840. He was elected a member of the National Academy in 1869, and is noted as a figure, flower, and landscape painter. He executed the frescos in Trinity Church, Boston. His various works have obtained high praise from the critics for imagination, suggestiveness, and charm of color. Among them are View over Newport, New England Pasture Land, St. Paul at Athens.

LAFAYETTE, a city of Indiana, county-seat of Tippecanoe county, is very pleasantly situated on the River Wabash, 63 miles N. W. of Indianapolis. It is also on the Wabash and Erie Canal. Four important trunk lines of railway pass through the city, and various branch lines contribute to the business facilities of the place. The city has a court-house, churches of all the prominent denominations, a high-school, an academy, several daily and weekly newspapers, 5 national and several other banks, a convent, hospitals, orphanages, etc. It is the seat of Purdue University, a well-endowed institution, under State control, in which agriculture and industrial training are the special objects of attention. Lafayette has extensive manufacturing interests. The goods manufactured include farming implements, machinery, railway-cars, beer, cooperage, spirits, wagons, etc. Pork-packing and the handling of grain are leading pursuits. The city is the principal market for a large and highly fertile district. The immediate vicinity is hilly and very pleasant. The population in 1870 was 13,506; in 1880, 14,860.

LAFAYETTE COLLEGE is beautifully located at Easton, a picturesque and thriving town of Eastern Pennsylvania, two hours' ride from New York westward, and a little more than that from Philadelphia northward. The institution was chartered in 1826, but long before that the question of founding a college here had been agitated, and in 1824 decisive steps were taken to that end. This was the year of Lafayette's return and triumphal progress through the country, and the name—Lafayette College—was a grateful tribute to the talents, virtues, and signal services of the illustrious patriot. The aim of the originators, among whom Col. Thomas McKeen, James Madison Porter, Hon. Joel Jones, and David Wagner were prominent, was to found an institution which should be devoted mainly to science and the usual branches of classical learning; but where students should also be trained in military tactics, civil-engineering, and the use of the modern languages. In their memorial to the legislature they express regret at the neglect of living languages in our colleges, and especially urge the importance of the study of English as a part of the education of our youth. Their words are significant in view of the excellent course in English philology for which Lafayette has now long been famous.

The infant college was the scene of several experiments in education. One was a plan by which students might maintain themselves by manual labor. Another was an adjunct training-school for teachers, a feature which became the germ of the normal school system of Pennsylvania. There was also in the early days a chair of jurisprudence, and the catalogues from year to year registered lists of names under the head of "law-students."

The feature of discipline in military tactics was early abandoned, and the college gradually settled into the usual curriculum of classical education. Grateful mention should be made of the character and labors of the first president, Rev. George Junkin, D. D. No man could have been found more fit to carry an institution through the struggles which Lafayette had to encounter. Magnanimous, self-sacrificing, tender in his affections, but strong in will and force of character, gifted too with a special religious purpose in his educational work and signal ability as a scholar, Dr. Junkin left a profound impression upon the college as well as in the church. His presidency continued, with a break of three years (1841–44), until 1848. During the interval of three years the college was under the executive care of Rev. John W. Yeomans, D. D. The line of presidents since Dr. Junkin's final resignation has been as follows: Rev. Charles W. Nassau, D. D. (1848–51); Rev. D. V. McLean, D. D. (1851–57); Rev. G. Wilson McPhail, D. D. (1857–63); Rev. W. C. Cattell, D. D. (1863–83); Rev. J. H. Mason Knox, D. D., present incumbent.

Like most institutions of the kind, where the tuition is reduced to a mere nominal fee, the college has at times felt the want of adequate financial support. The almost phenomenal growth of recent years dates back to the times of the civil war, and followed a period of depression unprecedented in the history of the institution. In 1863 there were not seniors enough left for a commencement, and the whole number of students had gone down from 106 (in 1856) to 39. With the inauguration of Dr. Cattell, Lafayette felt a new thrill of hope and the tide turned. New friends came with the new president, notably among them Mr. Ario Pardee, of Hazleton, who began his benefactions with a gift of $20,000, the largest sum at that time ever given by one person to any similar institution in Pennsylvania. This, however, was but a beginning. Gift followed upon gift from him in funds, and buildings, and apparatus, until the authorities were enabled to announce four entire new courses of instruction, scientific and technical, now known as the "Pardee Scientific Department" of the college. Other friends followed rapidly with various forms of benefaction, so that a few years made great changes on Lafayette heights. The grounds were enlarged and beautified, new buildings arose, an astronomical observatory, a chemical hall and laboratories, six additional dormitories, a reading-room, a chapel, a gymnasium, and the crowning structure of the whole group, Pardee Hall, a building in its extent and the beauty of its architectural design, as well as in its equipments for scientific instruction, second to none of the kind in the whole country.

The last annual catalogue registered a faculty of 26 members and 290 students. The report of Pres. Knox to the board of trustees for the year 1884 places the total capital stock of the college at $861,062.94, and the income from all sources for the same year at $38,614.12. The former sum has been slightly and the latter sum considerably increased in 1885.

There are six full courses of instruction, including, I. Three courses of general culture: 1. Classical; 2. General scientific (with modern languages in place of Latin and Greek); 3. Latin scientific (omitting Greek and substituting modern languages). II. Technical courses: 1. In engineering—civil, topographical, and mechanical; 2. In mining and metallurgy; 3. In analytical chemistry. Besides these there are post-graduate courses in which graduates and others who have suitable preparation may pursue advanced studies in the various departments, having use of the laboratories, apparatus, collections, and libraries.

The curriculum has come to its present form under the hands of many eminent and gifted educators. In mathematics there was Hon. Washington McCartney, LL. D., who was succeeded by Prof. James H. Coffin, LL. D.; in chemistry and the natural sciences, Dr. Traill Green, M. D., LL. D., and Dr. Thomas C. Porter, D. D., LL. D., both still in the faculty; in languages, Prof. Robert Cunningham, Rev. James C. Moffat, D. D., and Rev Lyman Coleman, D. D., in the earlier times; and more recently Prof. Francis A. March, LL. D., Prof. A. A. Bloomberg, Ph. D., Prof. R. B. Youngman, Ph. D., and others.

The college has been a pioneer in making provisions for the philological study of Anglo-Saxon and English, having established the course as early as 1855, and has won great renown by the labors of Dr. March in this department. The department also includes comparative philology, so that the whole scheme of linguistic study is organized upon the methods of Dr. March, with a view to the application in daily work of the best results of modern research, and to laying the foundations for the thorough study of the science of language.

In its situation Lafayette is especially fortunate. It is in the midst of the great mining and manufacturing region of the Middle States. The coal mines are near at hand, and the technical student finds every process used in the mining and working of the various ores of iron, as well as every resource of engineering, displayed almost within sight of the campus. In its natural beauty also, and its healthfulness, and in the abundance and cheapness of the means of living, the place has striking advantages as a seat of learning.

Though one of the younger colleges, Lafayette has a creditable representation in the fields of literature and science, and a goodly list of alumni who have become prominent as professors, teachers, ministers of the gospel, and in other learned professions, as well as in engineering, metallurgy, and other lines of business life. (W. B. O.)

LAFITTE, Jean, popularly known as "The Pirate of the Gulf," was born in France about 1780. Contradictory assertions are made as to his early life. He first comes into note in 1813, as the head of a band of adventurers on the island of Grande Terre, in Barataria Bay, about 35 miles W. of the mouth of the Mississippi. They had been engaged in privateering originally, under the French flag, and afterwards under that of Carthagena. Taking advantage of their opportunities, they were reckless of the ownership of the vessels which they seized. The cargoes were sold openly at Barataria, and the people of Louisiana resorted thither for bargains. The civil authorities were baffled in their endeavors to put a stop to the unlawful operations, and in 1814 an expedition was sent to Barataria, under Commodore Patterson, but Lafitte had temporarily abandoned the place. About September 1, Col. Nicholls, commanding the British forces at Pensacola, offered Lafitte inducements to enter the service of Great Britain. The latter, however, communicated the letters to Gov. Claiborne, of Louisiana, and offered his services in defence of the State on condition of pardon for past offences. In December, when the British were approaching New Orleans, these terms were accepted, and Gen. Jackson employed Lafitte in fortifying the passes of Barataria Bay, while part of his followers garrisoned the forts on the Mississippi. Lafitte and his men fought in the battle of Jan. 8, 1815. On Feb. 6, 1815, Pres. Madison issued a proclamation, reciting the facts and granting pardon to those who should be certified as having engaged in the defence of New Orleans. Yet some accounts represent Lafitte as having returned to his former pursuits, making his head-quarters on Galveston island. He is said to have perished at sea in 1817. He is described as tall and handsome, with pleasing manners and unbounded control over his men. For various accounts of his career see *DeBow's Review*, Gayarré's *Louisiana*, Latour's *War in Louisiana*, and Parton's *Life of Jackson*.

LAMAR, Lucius Quintius Cincinnatus, an American statesman, was born in Putnam co., Ga., Sept. 17, 1825. He graduated at Emory College, Oxford, Ga., in 1845, studied law and was admitted to the bar at Macon, Ga., in 1847. He was adjunct professor of mathematics in the University of Mississippi for one year, and in 1850 settled at Covington, Ga., as a lawyer. In 1853 he was elected to the Georgia legislature, but in 1854 removed to a plantation in Lafayette co., Miss. He was elected to Congress in 1857, but resigned in 1860 to take part in the secession movement. In 1861 he entered the Confederate army as lieutenant-colonel, and was promoted to the colonelcy. In 1863 he was sent by Jefferson Davis as a diplomatic agent to Russia. At the close of the war he was made professor of political economy and social science in the University of Mississippi, and in 1867 professor of law. His civil disabilities having been removed, he was elected to Congress in 1873 and to the U. S. Senate in 1877, being re-elected in 1882. Pres. Cleveland appointed him secretary of the interior in 1885. While in Congress he was noted as one of the most eloquent and effective speakers. Though steadily refusing to admit that there was any moral or legal wrong in secession he has, since the defeat of the attempt, exerted himself to restore harmony between the different sections.

LAMAR, Mirabeau B. (1798–1859), an American statesman, was born at Louisville, Ga., Aug. 16, 1798. He was engaged in trading and planting, and in 1828 established the *Inquirer* at Columbus, Ga., in defence of State rights. In 1835 he removed to Texas, and being made major-general in the Texan army, fought at San Jacinto. In 1836 he was chosen vice-president and in 1838 president of the Republic of Texas. In the war with Mexico, which followed the annexation of Texas to the United States, he fought at Monterey and on the northern frontier. In 1857 he was appointed U. S. minister to the Argentine Republic, and in 1858 to Costa Rica and Nicaragua. He died at Richmond, Texas, Dec. 19, 1859.

LAMELLIROSTRES, an order of aquatic birds of the sub-class *Natatores*, which is divided into two remarkably diverse families, the *Phœnicopteridæ*, or flamingoes, and the *Anatidæ*, geese, ducks, swans, etc., The name of the order refers to the lamellated character of the bill. Both mandibles have series of laminar or tooth-like projections, which alternate and fit into each other. The tongue is fleshy, with a horny tip and serrated edges, corresponding to the teeth of the bill. The feet are palmate and webbed, the wings of medium length, the tail usually short and many feathered. The position of the body in walking is horizontal or nearly so. The formation of the body is excellently adapted to swimming. In sexual habit they are frequently polygamous. The diet varies, but is usually more vegetable than animal.

LANCASTER, a city of Ohio, county-seat of Fairfield county, is on the Hocking River and Canal, 32 miles S. E. of Columbus. It is also on the Pittsburg, Cincinnati, and St. Louis Railroad, at the crossing of the Hocking Valley Line. It is a well-built town, with wide and handsome streets, and stands in a fertile and picturesque valley. It has a fine court-house, a high-school, a city-hall, good public school-buildings, 2 national banks, 10 churches, and several newspaper offices. It has machine-shops, foundries, railway-shops, and other manufactories. Population in 1870, 4725; in 1880, 6803.

LANCASTER, a city of Pennsylvania, county-seat of Lancaster county, is near Conestoga Creek, 69 miles W. of Philadelphia. It is on the main line of the Pennsylvania Railroad, and is reached by a branch line of the Reading Railroad system. Its streets are straight and cross each other at right angles. The city is substantially built, chiefly of brick, and is gas-lighted and supplied with water from Conestoga Creek. Among the noteworthy buildings and institutions are the court-house, the county-prison, Franklin and Marshall College (founded in 1853 and sustained by the Reformed Church), and a theological seminary (Reformed). The city has many churches, several daily, weekly, and monthly newspapers, good public and private schools, hospitals and libraries, 4 national banks, and great warehouses for tobacco, which is one of the principal articles of the city's extensive trade. Lancaster stands in a very rich, populous, and beautiful farming country, and is the chief market for a large territory. The manufacturing interests of the city are important, and have of late years been greatly extended. The city has large cotton-mills, several breweries, tanneries, and establishments for manufacturing machinery, metallic goods, hardware, paper, musical instruments, pottery, and a great variety of other articles. Lancaster was founded in 1730, and was the capital of Pennsylvania from 1799 to 1812. The population in 1870 was 20,233; in 1880, 25,769. The population is largely of German origin.

LAND. See PUBLIC LANDS.

LANDLORD AND TENANT. See this title in ENCYCLOPÆDIA BRITANNICA, and articles on DISTRESS, AVOWRY, and REPLEVIN.

LANDSCAPE GARDENING is the art of improving the appearance of ground by modifying its shape and covering its surface with living plants that are intended to develop under skilful cultivation and produce a pleasant impression of natural growth on the eye, in accordance with a preconceived design, which also includes the provision of agreeable ways of access wherever required by the observer.

In every case in which a dwelling is surrounded with grounds of sufficient extent to permit of ornamentation, and where the proprietors are possessed of the requisite wealth and taste, some attempt to render these grounds more beautiful by skilful management of slopes and levels, green sward, bushes and trees, streams, ponds, etc., is very sure to be made, and in this lies the essence of the art of landscape gardening in which the opportunities presented by nature for adornment are taken advantage of by art to the production of pleasing and graceful effects. The primary necessity in every such enterprise is, of course, that of properly arranged walks and drives, composed of material hard enough to be suitable for this purpose. The second necessity is the providing of additional spaces covered with some natural growth of a soft and flexible character that can be trodden under foot occasionally without serious injury to its structure. Experience has shown that such a surface may be found in green sward, which is produced by sowing seeds of grass in suitably prepared soil and by cropping off the heads of the growing plants from time to time, so as to concentrate a special capacity for vigorous development in that portion of the plant which is nearest the ground. A tender, green, ever-new carpet is thus obtained that is always fit to be walked on in fair weather, although full of delicate vitality. The bright color and velvety appearance of a flat stretch of sod or turf made in this semi-natural way is always pleasant to the eye, however small its dimensions may be, but, whenever the space available for improvement is larger than is needed for actual use by the occupants of the house, as a comparatively level grass-plot it naturally tends to become what is called a lawn, which is a less monotonous arrangement of smooth, well-kept green sward, that has some variety of modelling in addition to its flat surface, being of sufficient extent to suggest a recognition of the original trend of the ground in its contours and to justify the introduction at intervals of spaces not intended to be walked on, which may be covered with free-growing plants that have a natural look in connection with its verdant open stretches of close-cut grass and are more easily kept in order. Such spaces when planted must be occupied either with flowering-plants, leaf-plants, shrubs, or trees, and the exercise of individual taste in the arrangement of the home lawn and of the planting in connection with it becomes almost, by a process of natural evolution, the initial step to be taken in all landscape gardening improvements of a private character.

The different natural ways of using plants might evidently be illustrated in one composite form by having a rather closely planted and compact *mass*, with projections consisting of plants more loosely grouped together, outlying *single plants* being introduced here and there a little detached from the *groups*, but near enough to be always seen in connection with them. As experience shows that such a simple union of natural expression with harmonious cultivation is pleasant to the eye, and that countless modifications of the same general idea are possible, the opportunity to make an agreeable combination of single plants with groups, and of groups with masses, becomes the main resource on which the landscape gardener depends whenever a plantation is to be made in the natural style.

The group may be considered the key-note of this style. Even three trees may be pleasantly connected in a group and give an attractive individual character to a small pleasure-ground, while the largest and finest parks are composed of a succession of groups of well-developed trees, which at a little distance appear to the eye to become masses and at a greater distance look like thick woods.

Trees should, therefore, never be crowded into a close clump which has a formal and unsightly appearance, nor placed in any regular or artificial manner, but so disposed in natural groups that the whole may exhibit the variety, connection, and intricacy seen in nature.

In the landscape composition of the larger masses trees of medium and smaller size should be so interspersed with those of larger growth as to break up all formal sweeps in the line produced by the tops of their summits, and occasionally low trees should be planted on the outer edge, so as to connect what may be called the outline of the composition with the sloping or horizontal ground-line from which it springs.

In the arrangement of fringes of shrubbery, in connection with stretches of lawn, the elementary laws of composition are as applicable as in larger and more comprehensive problems. There must be effective grouping in each composition, with outlying and salient plants to give the needed variety and contrast. There must also for the same reason be combinations of local color.

A soft verdant lawn with flowering shrubs and a few forest or ornamental trees well grouped in connection with the walks, is found to give universal pleasure and to become the most enduring source of enjoyment in any country place, as it contains in itself the basis of all our agreeable sensations in landscape gardening, natural beauty heightened by art.

Having first secured a stretch of green sward, planted in this way, in connection with the residence, of sufficient scope to answer its purpose as a home lawn, other similarly treated subsidiary spaces of highly kept grass may be directly connected with it by walks and thus add to the general extent of the portion of ground devoted to lawn-planting.

If the pleasure-ground is of sufficient size to admit of a greater variety of treatment, some portion of the green sward may be planted with groups and single specimens of large, umbrageous trees, without any shrubbery being used, the tamest level, with scarcely a glimpse of distance, being rendered lovely by charming groups of trees.

Another part of the ground may be occupied with walks through comparatively open woods, or through shrubbery closely planted, without the introduction of lofty trees; or the walks may be laid out on the margin of what appears to be a natural brook or an open pool of water. In each case the original suggestion of the ground ought to be accepted, and the changes made should be in the direction indicated by the existing contours, hollows being somewhat deepened and eminences somewhat heightened.

The object in view all the time manifestly is the permanent retention of the interesting features of the landscape, and the preservation and improvement of every natural characteristic of the site.

The planting, moreover, should be used to give emphasis to natural lines, and not to interfere with them. It is evident that the appearance of a dip or undulation 20 feet in depth may easily be destroyed and converted into a straight landscape line by using plants 10 feet high on the summit, and other plants varying from 10 to 30 feet in height on the slopes of the undulation and at the bottom of the hollow.

The wild garden is the technical name given to a portion of ground devoted to the growth, in an informal way, of herbaceous plants vigorous enough not to require the cultivator's care or a choice situation. It should be planted not only with native wild flowers, but with plants from other parts of the world that are known to be hardy, its object being to show, in a somewhat concentrated form, as much of the varied beauty of native and exotic hardy flowering plants as possible. It may be a narrow strip bordering a wood walk, or it may occupy an area of much larger extent with advantage, provided that its general shape is irregular, and its surroundings are free from formality.

Rockwork, particularly when situated in connection with water, as on the shores of a lake or brook, or associated with broken and highly picturesque conditions of surface, is a highly effective addition to landscapes, both in the broad reaches of nature and the more contracted spaces of the garden or park. If introduced artificially, the hand of art should be carefully concealed, and the work made to appear natural in itself and in harmony with its surroundings. Where there is a protrusion of natural work, it may need to be treated artificially to give it an appearance better adapted to the situation, and render its contours more pleasing and graceful. The use of climbing and rock-loving plants, such as ivy, Virginia creepers, ferns, laurels, rhododendrons, evergreens, etc., is here highly appropriate, through the contrast of color afforded, and their toning down of the natural roughness of the protruding rock. Such a group also serves as a fine foil to the more regular and artificial effect of flower-beds and shrubbery. Still more useful and important, in the production of pleasing effects, is the introduction of water into the scenery, or the utilization of existing water-courses. The shores of a lake or pond need to be differently planted, in accordance with the abrupt or the gradual nature of their slopes, the associated plants and trees being varied so as to best agree with the particular situation. The general effect of a small brook or stream in a landscape is to give it an effect of softness, and this should be attended to in the choice of brookside plants. Flowing curves, rippling waters, cascades, and still reaches are all highly beautiful additions to a landscape, and may be very effectively treated as adjuncts to the landscape garden.

It is always pleasant to obtain an effect of natural distance, seen through openings in the plantations, but it is not essential that the openings should be of great width, and if undesirable elements predominate the process of planting-out should be continued till all the disagreeable features are hidden from view; what is left having an irregular frame of foliage, devised with the special intention of emphasizing the opportunity for outlook in its most *picturesque* shape, and of preventing the observer from seeing more than is expedient. If a prospect is naturally broad, and the ground to be improved is sufficiently extensive, the lines of its middle distance should be made to lose themselves indefinitely, and unite gradually with those of the surrounding country. The light and color of the sky form also an important element of beauty in every attractive landscape. Most persons think they see a green tree as a definite and independent fact in nature, its relation to the azure hue and the silvery clouds of the heavens being considered accidental and comparatively unimportant; but the human eye cannot help taking in both at the same moment, and really gets a general impression that is made up of both.

The art of landscape gardening appeals directly to this delicate capacity in the human eye to blend foreground and middle distance, sky-line and sky, into one harmonious optical impression. Separate groups of tree-forms may be in themselves attractive, or a pleasure-ground may be rich in handsome, isolated specimens of trees, or in its varied and picturesque foreground of shrubbery, but in each case it will be defective as a landscape composition if it fails in its sky-line, and is consequently unattractive when seen in connection with the sky.

Although there is a regular gradation in the chiaroscuro of nature, which extends from the eye of the observer to the horizon, only three of the more obviously valuable contrasting planes need be referred to here. Near objects with clear outlines, strongly marked light and shade, and vivid local color, make up what is called the immediate foreground, which shows to better advantage if contrasted with a separate plane of what may be termed middle distance, that has more uniformity of color, being sufficiently removed from the eye to lose perceptibly in precision, in accordance with the law of aerial perspective; and this middle distance having thus acquired a somewhat generalizing half-tint, is made more attractive if in its turn it is relieved against a third plane of still simpler and more indefinite distance, from which it may be easily distinguished. The half-mysterious middle distance becomes in this way the keynote of the whole composition, whatever it may be. At the first glance it seems to be sufficiently attractive to be looked at all the time; but the human eye is constantly needing variety and recreation, even when observing what is beautiful in natural scenes, and experience shows that the pleasantest kind of change is to dwell occasionally on something of a corresponding character that is more definite in the foreground, and occasionally on something not dissimilar that is more indefinite in the distance. In the arts of architecture, painting, and sculpture the results are exactly determined by the limitations of the human brain and hand, but in the art of landscape design no such boundary line is recognizable. The designer of a landscape depends on bringing into successful play the great forces of nature, and thus secures for his work an undying vitality which can only follow from such a direct reliance on the resources of the Infinite.

Consequently, to quote the words of A. J. Downing, "He who would create in his pleasure-ground the more delicate shades of expression must become a profound student both of nature and art. He must be able by his own original powers to seize the subtle essence, the half-disclosed idea, involved in the finest parts of nature, and to reproduce it in his landscape garden."

In conclusion, a brief historical account of the development of the art of landscape gardening may be of interest. It began with the establishment of large civilized kingdoms, and the growth of artistic taste, though our first historical record of ornamental gardening is in the "Hanging Gardens" of Nineveh and Babylon, of which we only know that they were planted on lofty terraces. The Greeks and Romans seem to have paid much attention to the art, large sums being expended upon their gardens, which, from the descriptions of Pliny and others, were doubtless very tastefully arranged. Both in these early days and in modern times the mode of forming gardens has been to a large extent adapted to the climate and surface conditions of the countries concerned, ideas of utility being combined with those of beauty. Thus the gardens of sultry Southern Asia were planted with stately groves of wide-spreading shade-trees, yielding grateful relief from the enervating heat. In the genial climates of Southern Europe, on the contrary, the gardens were more open, low trees and shrubbery freely admitting the sunlight, while marble and bronze statues and ornate pleasure-houses added variety to the scene. These conditions have continued to exist. The gardens of modern Asia but repeat those of the past. In the revival of the art of gardening in Italy the Roman garden was closely imitated. This revival took place in the seventeenth century, mainly through the taste of Cardinal D'Est, whose celebrated gardens were made on the site of those of the Emperor Adrian, and adorned with the discovered vases, statues, etc., of the imperial pleasure-grounds. "Balustraded terraces of masonry; magnificent flights of steps; arcades and architectural grottos; lofty clipped hedges, with niches and recesses, enriched with sculpture, were the components of the Italian style of gardening." This Italian style made its way with some rapidity over Europe, with the revival of art. But it was quickly altered by the French, to accord better with the character of their climate and more level country. The terraces and arcades of Italy were replaced with wide grass-plots, long avenues of trees, and intricately modelled flower-beds, with much less of architectural display. This French style, culminating in the reign of Louis XIV., in turn made its way over Europe, the ideas of Le Notre, its master spirit, being everywhere repeated. Somewhat later, another modification of the Italian, known as the Dutch style, and adapted to the flat landscapes of Holland, made its appearance. In this method formal regularity replaced the picturesqueness of nature, and long slopes of grass, artificially shaped areas of land and water, trees in pots, or planted in geometrical patterns, and closely clipped, formed the distinctive features, the desire to improve on nature being carried at times to the extreme of grotesqueness. This style, in its turn, had its admirers. It was introduced by William III. into England, where it was the rage for half a century. Yet the Dutch in one respect advanced the art of gardening. They introduced many beautiful exotics, mainly from the East Indies, and some of these yet remain the most highly valued ornaments of our gardens. The several styles named had prevailed successively in England. They were succeeded by what is known as the natural style, that which is still under process of development. Brown and Kent, the leaders in this reform, taught that nature, not art, must be the model of the gardener. Nature had been tortured out of shape to produce pleasing effects. With the fuller cultivation of the eye and the mind, the superior charms of nature's handiwork were recognized, and the desire to imitate and reproduce them arose. "The straight lines and stiff terraces of the ancient style were succeeded by flowing lines, extensive, smooth lawns, and verdant slopes; the formal avenues and geometrical clumps, in which trees had been arranged, were superseded by pleasing curves, and an irregularity of grouping, which relieved the eye and beautified the scene." (Kern's *Landscape Gardening*, page 23). This idea made its way but slowly, several injudicious variations being attempted. It owed its full development to Humphrey Repton, who in the early years of this century established the true art of gardening on a firm basis. To his genius we owe the inception of that cultivated art now everywhere seen in the gardens and parks of England. This style quickly made its way over Europe, being introduced into Germany by Louis Von Sckell, who added important effects by the free introduction of wood and forest scenery. Many of his works are yet considered masterpieces.

In America the art of landscape gardening has as yet made but slow progress, though the recent growth of wealth and the rapid development of artistic taste have given an impetus to the art which promises to bring it to a level with the best works of Europe. As yet the fashionable cemetery and the city park have been the main fields for its exercise on a large scale, though the adornment of private grounds by the art of the landscape artist is growing in public esteem. The conditions of nature and climate in America will undoubtedly modify the art, as has been the case abroad, and produce distinctive handlings adapted to the several regions of our country. Yet there is no reason to believe that the formally artificial will ever again replace the natural as the ruling feature in landscape gardening. (C. V.)

LANE, James Henry (1814–1866), an American politician, was born at Lawrenceburg, Ind., June 22, 1814. He was admitted to the bar in 1840, and in 1846 enlisted as a private in an Indiana regiment, but was soon promoted to be colonel, and at the battle of Buena Vista commanded a brigade. In 1849 he was elected lieutenant-governor of Indiana, and in 1853 was elected to Congress. There he voted for the Kansas-Nebraska bill, and in 1855 he removed to Kansas, where he took an active part in the formation of a State government. He was president of both the Topeka and the Leavenworth Constitutional Conventions. In 1856 he was chosen to the U. S. Senate by the Free State legislature, but was not allowed to take his seat. He was major-general of the Free State forces in the contest with the border ruffians. He was indicted for high treason by the pro-slavery government, and in 1858 was tried for murder, but was acquitted. In 1861 he was elected to the U. S. Senate, and during the civil war he was for a time brigadier-general of volunteers. In 1866 he was enfeebled by disease, and on July 11, 1866, he died by his own hand at Leavenworth, Kansas.

LANG, John Dunmore (1799–1878), an Australian clergyman and statesman, was born at Greenock, Scotland, in 1799. He graduated at the University of Glasgow, and, after being ordained by the Presbytery of Irvine, went to Australia in 1823 as the first minister of the Church of Scotland. He gave great impetus to the immigration of industrious settlers with religious teachers. He was active in political affairs and made abundant use of the newspaper press. Frequently elected to the legislative assembly, he assisted in securing the independence of Victoria and Queensland from New South Wales. He also labored successfully for the union of the Presbyterian churches of Australia and the establishment of the Australian Presbyterian College, of which he was made principal. He died at Sydney in 1878. His principal publication is *The History of New South Wales* (1834), which passed through many editions. He published also works on the other Australian colonies.

LANGDON, John (1741–1819), an American senator, was born at Portsmouth, N. H., in 1741. He engaged in business there, and in 1774 secured the ordnance stores of the fort near the town for the use of the colonists. In 1775 he was a member of the Continental Congress, and in 1776 he was navy agent and speaker of the New Hampshire assembly. He furnished the means for equipping Gen. Stark's brigade and commanded a company in it. In 1779 he presided in the New Hampshire convention, and in 1787 he was a delegate to the convention at Philadelphia to frame the U. S. Constitution. He was elected governor of New Hampshire in 1788 and U. S. Senator in 1789. He was again governor 1805–09 and 1810–12. He died Sept. 18, 1819.

LANGE, Johann Peter (1802–1883), a German theologian, was born at Sonnborn, near Elberfeld, April 10, 1802. Having with difficulty obtained a preparatory education, he entered the University of Bonn in 1822, where he studied theology. He was pastor in several places until 1841, when he was made professor of church history and dogmatics at Zürich. In 1854 he was called to Bonn as professor of systematic theology, and in 1860 he was made counsellor of the consistory. He died at Bonn, July 8, 1883. His theological works are among the best of their class and his great *Bibelwerk*, or *Commentary*, has given him extensive and deserved fame. In the latter he was assisted by several able divines, and the American edition, by Dr. Philip Schaff, is further enriched by valuable annotations. Lange's other works comprise *Leben Jesu* (3 vols., 1844–47), which was intended as a refutation of Strauss; *Die christliche Dogmatik* (3 vols., 1849–52); *Das apostolische Zeitalter* (1853–54).

LANGEVIN, HECTOR LOUIS, a Canadian statesman, was born at Quebec, Aug. 15, 1820. He was educated at Quebec College and in Montreal, and was called to the bar in 1850. He was also active as a journalist at Montreal and Quebec. He was elected mayor of Quebec in 1857 and representative in the provincial parliament in 1858. He entered the cabinet as solicitor-general for Lower Canada in 1864, and became postmaster-general in 1866. Having taken an active part in inaugurating the confederation of Canada, he was made secretary of state in the dominion cabinet in 1867, and from 1869 to 1872 was minister of public works. He is a conservative in politics, and has published *Droit Administratif des Paroisses* (1862).

LANGSTON, JOHN MERCER, an American lawyer, was born at Louisa C. H., Va., Dec. 14, 1829. He was born a slave but was emancipated in childhood. He graduated at Oberlin College in 1849 and studied theology in the same. After studying law he was admitted to the Ohio bar in 1854, and practised his profession in that State until 1867, when he was made professor in Howard University, Washington. In 1873 he became vice-president and acting-president of the university. He also held public positions in the District of Columbia. In 1881 he was sent as U. S. minister to Hayti, and was recalled in 1885. He is noted as an orator and writer upon political and literary subjects.

LANIER, SIDNEY (1842–1881), an American poet, was born at Macon, Ga., Feb. 3, 1842. After graduating at Oglethorpe College in 1860, he served in the Confederate army during the civil war, and for five months was a prisoner. In 1866 he was admitted to the bar and afterwards had a school at Prattville, Ala. His inclination was strongly to literature, and his first book was a novel, *Tiger Lilies* (1867). Soon his poems attracted the attention of critics, and he was selected to prepare the *Ode* for the opening of the Centennial Exhibition at Philadelphia. He afterwards delivered lectures on literary subjects and was made professor at Johns Hopkins University. In his *Science of English Verse* (1881) he presented the technicalities of metre in a novel form. Yet his thorough study of the mechanical part of verse did not obscure nor overload his grand poetic genius. Destined to be a victim of consumption, he used his failing strength to prepare modernized editions of Froissart (1879), *King Arthur* (1880), and *Mabinogion* (1881). He died at Lynn, N. C., Sept. 8, 1881. After his death his lectures on *The English Novel and its Development* (1883) and his *Complete Poems* (1884) were published. Lanier was a thoroughly Southern poet, and the greatest yet produced by that section of the United States.

LANKESTER, EDWIN (1814–1874), an English physician, was born at Melton, April 23, 1814. He studied medicine at University College, London, and at Heidelberg, graduating at the latter in 1839. He was afterwards professor and lecturer at various institutions in London. He published *Vegetable Physiology* (1868), *School Manual of Health* (1869), and other works for popular use.

His son, EDWIN RAY LANKESTER, an English physicist, was born in London, May 15, 1847. He was educated at Christ Church, Oxford, and became fellow and lecturer of Exeter College, Oxford, in 1872. He was made professor of zoölogy and comparative anatomy in University College, London, in 1874. In 1869 he became chief editor of the *Quarterly Journal of Microscopical Science*. From 1870 to 1874 he was one of the secretaries of the British Association for the Advancement of Science. He prosecuted the spirit-medium Slade in 1876 and compelled him to leave England. Besides contributions to leading periodicals, Prof. Lankester has published *Fossil Fishes of the Old Red Sandstone* (1870); *Comparative Longevity* (1871); *Developmental History of the Mollusca* (1875).

LANMAN, CHARLES, an American author, was born at Monroe, Mich., June 14, 1819. Receiving an academical education, he became a clerk in New York city, and in 1845 a journalist at Monroe and at Cincinnati. He made a canoe-voyage on the Mississippi and Lake Superior and returned to New York. He settled at Georgetown, D. C., in 1848, and held various positions under the government, while also acting as newspaper correspondent. He published *Essays for Summer Hours; A Summer in the Wilderness* (1847); and other books relating to his adventures as a tourist. His most important work is his *Dictionary of Congress* (1859), which has passed through six editions. Lanman was at one time private secretary of Daniel Webster and edited his *Private Life* (1852). He was also secretary of the Japanese legation and published *The Japanese in America* (1872). He has since devoted himself to painting American scenery.

LANSING, a city, capital of Michigan, is in Ingham county, and on both sides of Grand River, 85 miles W. N. W. of Detroit, lat. 42° 45′ N.; long. 84° 32′ W. Four important lines of railway pass through the city. Among the principal buildings are the State capitol, the State Reform School, and the Michigan School for the Blind. The city has 4 hotels, 2 national and 2 other banks, 3 weekly and 1 daily newspaper, 9 churches, and 8 public schools. The city is the seat of the State Agricultural College and of an industrial school. There are 5 iron bridges across the Grand River, which affords a good water-power. The principal articles manufactured are stoves, wagons, carriages, wheelbarrows, flour, and farming implements. The town is lighted with gas, and has a park and public water-supply. The valuation for tax purposes is about $5,000,000; the public debt, $155,000. When, in 1847, Lansing was made the State capital, the whole region was timbered, and forests covered the town-site. Lansing was incorporated as a city in 1859. The population in 1870 was 5241; in 1880, 8319.

LANSINGBURG, a village of New York, in Rensselaer county, is on the E. bank of the Hudson River, opposite Waterford, and 3 miles N. of Troy. The river is here navigable for small vessels. The village is on the Troy and Boston Railroad, and has an academy, 6 churches, 2 national banks, a house of Augustinians, and a newspaper. It has extensive manufactures of brushes, oil-cloths, biscuits, and other goods. It was founded in 1774. Population in 1870, 6372; in 1880, 7432.

LAPHAM, INCREASE ALLEN (1811–1875), an American geologist, was born at Palmyra, N. Y., March 7, 1811. He became a civil engineer, and was engaged on the Miami, Welland, and Louisville Canals. He was secretary of the Ohio canal commissioners, 1833–35, and in 1836 settled at Milwaukee, Wis., where he held various offices, giving also much attention to all branches of physical science and their practical results. In 1873 he was made State geologist and organized a survey of Wisconsin. He died suddenly at Oconamowoc, Sept. 14, 1875. Besides contributions to scientific periodicals he published *Wisconsin: Its Geography, Topography, History, Geology, and Mineralogy* (1844; 2d ed., 1855); *Geological Map of Wisconsin* (1855); *Antiquities of Wisconsin* (1855).

LA PORTE, a city of Indiana, county-seat of La Porte county, is on the Lake Shore and Michigan

Southern, the Chicago and West Michigan, and the Wabash, St. Louis, and Pacific Railroads, 50 miles E. S. E. of Chicago. It has a court-house, jail, city-hall, 7 hotels, a national and 3 other banks, 3 weekly newspapers, 18 churches, and many schools, public and private, and carries on manufactures of wheels, threshing-machines, wagons, furniture, castings, machinery, cigars, and other goods. It stands in a level and very fertile region, and is well built, the streets being wide and densely shaded with maples. Immense quantities of ice are shipped from the lakes around the town, which is gas-lighted, and has public water-works and a park. The tax valuation is $3,000,000; public debt, $80,000. Population in 1880, 6195.

See Vol. XIV. p. 309 Am. ed. (p. 289 Edin. ed.).

LARCH. The reputation which the larch had achieved in Europe as a timber-tree led to extensive plantings in America, when the modern zeal for forestry took practical shape about a quarter of a century ago. Hundreds of thousands were planted, especially in the West, and Larchwood, a town in Lyon co., Iowa, was so named from larch plantations set out there in 1870. The growth was found to be very rapid; at Champaign, Ills., reaching 10 feet in six years from seed. After 17 years' experience, Pres. Matthews, of the Iowa Agricultural College, pronounced the wood comparatively worthless, and since then numerous others have expressed disappointment. In the celebrated plantations of Richard Fay, at Lynfield, larches 24 years planted were found to be diseased. In European plantations the diseases of the larch are enumerated as heart-rot, surface-rot, and the blight caused by the larch-borer. In America the leaves are injured by a minute fungus, which destroys a large portion of the leaves before the wood is mature. The failure is probably due to the selection of too low an elevation and too rich a soil. Its proper conditions seem to be a dryish, rocky soil, and an elevation of about 5000 feet altitude, or lower, as the latitude extends northward. When the conditions suited to each species of forest-tree are better understood, the larch may be again popular for forest planting in America. Although a resinous tree, the larch is found unfit for firewood. Pine, or even oak, will be reduced to ashes before the larch block is more than charred. But this gives it value in buildings where there is danger of fire. The paintings of some of the best Italian masters are on larch panels, selected expressly from the indestructibility of the wood. Fishing-boats made of the wood have been found to have about a threefold durability over the pine of Norway (*Abies excelsa*). In the dry, gravelly soil of Bartram's Botanic Garden, near Philadelphia—conditions just suited to it—a tree of the European larch reached over 100 feet high, and seemed to have as sound timber as the best specimens of Europe. The common American larch (*Larix Americana*) of Michaux also requires high or cool northern regions to reach perfection. It extends from Northern Pennsylvania to the eastern shores of Hudson's Bay, and westwardly through Northern Indiana, Illinois, and Central Minnesota, reaching on the north-west Bear Lake and the valley of the Mackenzie River. It is readily distinguished from the European species by its irregular habit of growth in mature trees, as well as by the smaller cones, and, unlike its European congener, prefers swampy ground to dry hills. The localities are known as tamarack swamps. Tamarack seems an early aboriginal name. Pursh, in his *Northern Journal* (1802), records it as being the name it went by in the Pocono Mountains of Pennsylvania. Michaux and Hoopes say hackmatack is a more northern name. The wood is popular with the Canadians for ship-building, and Lapham says in Wisconsin it makes the best hoop-poles. Sargent says it is preferred and largely used for the upper knees of vessels, for ship-timbers, fence-posts, telegraph-poles, railway-ties, etc. A remarkable feature in its history is that when it is cut off, or from some circumstances decays, it is followed on the land by the balsam fir (*Abies balsamea*). Those who grow the larch from seed in America shade the seed-beds. As early as 1870 European trees produced seed in the larch plantations of Seward, Nebraska, and it is believed the young trees from the native seed may do better for our forestry than the European.

The Western larch (*Larix occidentalis*), a native of the Rocky Mountains of Montana, Blue Mountains of Washington Territory, of Oregon, the Cascade Mountains, and the Selkirk and Gold ranges of British Columbia, is also called tamarack. It grows in dry places, much as the European does, but evidently requires a moist atmosphere. As found in these locations it "is the largest and most valuable timber-tree of the Columbia Basin" (Sargent).

A third American species grows in Northern Montana and the Cascade Mountains, where it was discovered by Lyal (*Larix Lyalii*). The leaf-buds and young shoots are covered by a cottony down. It is a straggling Alpine tree, much smaller than the other.

A number of species are native to Japan. *Larix Kæmpferi*, *L. microsperma*, and *L. leptolepis* are the best known of these. The many curious figures of birds, beasts, or other things that abound in Japanese gardens are made from *Larix leptolepis*. The branches will not break easily, and it can be easily bent or trained in any manner. The Japanese name for it is Fuzi-Matzu. It is found in Japan as low as latitude 35°, and may, with the other species from that country, be found of much more value in American forestry than those from other portions of the world. Experiments with a few plants in gardens, especially of *L. leptolepis*, favor this suggestion. (T. M.)

LARD. See PORK and PORK-PACKING.

See Vol. XIV. p. 315 Am. ed. (p. 314 Edin. ed.).

LARK, the name of a rather small group of birds, of the family *Alaudidæ*, which are well defined by the character of their feet, which fit them to a terrestrial life. The toes have long, straight claws, the claw of the hind toe equalling or exceeding its digit in length. The wings are long and pointed. There are about 100 species in all, North America having but one genus, *Eremophila*, and two or three species or varieties. *E. alpestris*, the horned or shore lark, has a conoid bill, shorter than the head, the nostrils densely feathered, and a peculiar little tuft of lengthened feathers over each ear, resembling the horns of certain owls. The claws are very slender and sharp. It is a migratory bird, inhabiting open plains throughout the United States, and nesting on the ground. It lays 4 to 5 speckled eggs. It is a sweet singer in the spring. The color is a pinkish-brown above and white below, but the tints are highly variable. In Mexico there is a species or variety smaller in size and brighter in color. South America possesses another species, or perhaps only a variety. The common American meadow or field lark is quite distinct from the above. It belongs to the family *Icteridæ*, or starlings, genus *Sturnella*. The family is distinguished by the length, acuteness, and not strictly conical shape of the bill, from the finches. The meadow lark, *S. magna*, is of a brownish hue, with several of the lateral tail feathers white. The edge of the wing, a spot over the eye, and the under parts generally, are bright yellow, the breast being marked with a large black crescent. The feet are very large and strong, reaching beyond the very short tail. It is an imperfectly migratory bird, found everywhere in the open country in the Eastern United States, is partly gregarious and an agreeable vocalist. Its nest is made of dried grass on the ground, the eggs being 4 to 6, of white color, speckled with reddish. In the Western United States the variety *Neglecta* is of duller colors, and said to differ in song. The red-breasted lark, a South American species, is colored red in place of the yellow of the field lark.

LAROUSSE, PIERRE (1817–1875), a French publisher, was born at Toucy, in Yorme, Oct. 23, 1817. After teaching for several years he became engaged in 1851 in the publication of school-books, many of which he prepared himself. In 1863 he formed the plan of his *Dictionnaire Universel du XIXe Siècle*, and engaged contributors. It proved highly successful, but Larousse, exhausted by his labors in connection with it, died Jan. 3, 1875, when it was but half finished. The work, comprising altogether 16 large volumes, was completed by his widow.

LARREY, Baron Dominique Jean (1766–1842), a French surgeon, was born at Baudéan, July, 1766. He studied surgery with his uncle at Toulouse, and in 1787 was appointed surgeon to a frigate. After further study at Paris he entered the army in 1792, and served as surgeon in the wars of the French Revolution. To him is due the invention of the *ambulance volante*, for which he was promoted to be surgeon-in-chief. He served in Egypt, Germany, Spain, and Russia, everywhere displaying the utmost courage and extreme devotion to the needs of the sick and wounded. On the field of Wagram he was made a baron; at Waterloo he was wounded and captured. On the restoration of the Bourbons he was made surgeon of the royal guard, but was for a time deprived of his pension. Napoleon bequeathed to him 100,000 francs. While inspecting hospitals in Algeria he had an attack of pneumonia, and he died at Lyons, July 25, 1842. He made numerous important improvements in operative and clinical surgery. He also published memoirs of great value.

His son, Baron **Félix Hippolyte Larrey**, born at Paris, Sept. 18, 1808, was professor of pathology at Val-de-Grâce, surgeon to Napoleon III., and chief surgeon of the army in Italy in 1859. He has published valuable reports and memoirs.

LA SALLE, a city of Illinois, in La Salle county, is situated on the Illinois River at the head of steam-navigation, and at the terminus of Illinois Canal, which extends to Chicago. It is on the Illinois Central and Chicago, Rock Island, and Pacific Railroads, [illegible] miles W. S. W. of Chicago. Fine railway and highway bridges here cross the river. La Salle has [illegible] hotels, a national bank, 3 weekly newspapers, 7 churches, and public and private schools. The surrounding country is pleasantly diversified and of high fertility. La Salle has a large zinc rolling-mill and manufactories of glass-ware, castings, bricks, and metallic ware. Bituminous coal is extensively mined at this place. The town has a park and is lighted with gas and electricity. Fine limestone, glass-sand, and large quantities of valuable clay are obtained here. La Salle was first settled in 1837, and was incorporated in 1853. The valuation of property is $7,000,000; public debt, $32,000. Population in 1870, 5200; in 1880, 7847.

LASKER, Eduard (1829–1884), a German statesman, was born at Jarocin, Posen, Oct. 14, 1829, of Jewish parentage. He was educated at Berlin, and after spending three years in England, studying the laws of that country, he became in 1856 an assessor in the city court of Berlin. His liberal opinions and the articles which he published retarded his advancement as much as his religion. In 1865 he was elected to the Prussian chamber of deputies, where he assisted in founding the national liberal party, and gave Bismarck help in measures tending to the unification of Germany. In 1870 he became a member of the Reichstag, representing at first a district of Berlin, afterwards one of Saxe-Meiningen. His abilities as a constitutional lawyer were called into requisition in making uniform and codifying the laws of Germany. Yet he opposed Bismarck's measures in regard to government control of the railroads, and when the chancellor adopted the protective policy Lasker showed himself a determined advocate of free trade. Though poor he sacrificed opportunities of enriching himself as attorney in order to advance the public good. The struggle for leadership between Lasker and Bismarck became personal and bitter. In 1879 in the conservative reaction Lasker lost his seat in the Reichstag, though later he was re-elected and resumed his struggle with Bismarck. In 1883, his health being impaired by his labors, he made a visit to his brother in Texas, and while returning died suddenly in New York city, Jan. 5, 1884. The U. S. House of Representatives passed resolutions of regard which were transmitted to Germany by the U. S. government, but were returned by Prince Bismarck as containing improper reflections on the internal affairs of the German Empire.

LATHAM, Robert Gordon, an English philologist and ethnologist, was born in 1812 at Billingborough, Lincolnshire, where his father was vicar. He was educated at Eton and King's College, Cambridge, graduating in 1832, and being elected fellow. He studied medicine and became assistant in the Middlesex hospital. While travelling in Norway he studied the idioms of the Scandinavian language, and on his return to England published *Norway and the Norwegians* (1840), and some philological works. In 1840 he was made professor of English literature in University College, London, and published a *Treatise on the English Language* (2 vols., 1841) and other text-books. His later publications relate chiefly to ethnology, commencing with *Natural History of the Varieties of Mankind* (1850), and including *Man and his Migrations* (1851); *Ethnology of Europe* (1853); *Nationalities of Europe* (1863). He also edited the *Germania* of Tacitus (1850), and Johnson's *English Dictionary* (1870).

LATROBE, Benjamin Henry (1767–1820) an American architect, was born in Yorkshire, England, May 1, 1767. Being the son of a Moravian clergyman he was educated at the University of Leipsic, and served in the Prussian army. Returning to England, he studied architecture, and in 1788 was made surveyor of the public offices of London. In 1796 he visited the United States, and in 1798 settled at Philadelphia, where he built the Bank of Pennsylvania and the Schuylkill water-works. He completed the capitol at Washington in 1811, and after its destruction by the British, in 1814, he was called to superintend its reconstruction. He built the cathedral and exchange at Baltimore in 1817–18. He died at New Orleans in September, 1820. Besides his ability as an architect he was noted for wide scholarship and extensive attainments in natural science.

LATROBE, Benjamin Henry (1806–1878), an American engineer, son of the preceding, was born at Philadelphia, Dec. 19, 1806. He graduated at St. Mary's College, Baltimore, in 1823, studied law, and was admitted to the bar. In 1830 he abandoned this profession and became an engineer on the Baltimore and Ohio Railroad, assisting in locating its Washington branch and other divisions. He was chief-engineer of the Baltimore and Port Deposit Railroad, and in 1842 became chief-engineer of the main road, which he completed to Wheeling. He was afterward chief-engineer and president of various railroads, and consulting-engineer on important public works. He died at Baltimore, Oct. 19, 1878.

LAUNITZ, Robert Eberhard (1806–1870), an American sculptor, was born at Riga, Russia, Nov. 4, 1806. He studied under Thorwaldsen at Rome, and in 1828 settled in New York, being made a member of the National Academy in 1833. He executed the Battle monument at Frankfort, Ky.; Pulaski monument at Savannah, Ga.; the monument to Gen. G. H. Thomas at Troy, N. Y.; and several monuments in Greenwood Cemetery, Brooklyn. He died at New York, Dec. 13, 1870.

LAUREL, American. See **Kalmia.**

LAVAL-MONTMORENCY, François Xavier de (1622–1708), a Canadian prelate, was born at Laval, France, March 23, 1622. He was ordained priest in 1645, and was nominated bishop of Cochin-China in 1651, but declined the post. In 1653 he was made archdeacon of Evreux, and in 1658 vicar apostolic of New France, with the title of bishop of Petræa. He arrived at Quebec, June 16, 1659, where he superseded the vicar-general of the archbishop of Rouen. In 1662 he returned to France to obtain missionaries and means for his diocese. Returning to Canada in September, 1665, he organized the affairs of his diocese and overcame the opposition of the secular authorities. When again in France, in 1674, he received the title of bishop of Quebec, which gave further support to his authority. In 1688 he resigned the administration of the diocese to a coadjutor and retired to the seminary at Quebec, which he had founded and to which he finally transferred all his estate. He died at Quebec, May 26, 1708. He was a man of pure, upright, and devoted character, and throughout his administration was the virtual ruler of Canada in civil as well as ecclesiastical affairs. His name is commemorated in Laval University at Quebec.

LAVELEYE, Émile Louis Victor de, a Belgian economist, was born at Bruges, April 5, 1822. He was educated at Bruges and Paris, and studied law at Ghent, but since 1848 he has devoted himself to economical studies. Besides constant writing for Belgian journals in advocacy of liberal principles he has been, since 1858, a regular contributor to the *Revue des Deux Mondes*. In 1864 he was made professor of political economy in the University of Liége. He has visited other countries of Europe, and has received honors from many learned societies. He has published *Memoire sur la Langue et la Littérature Provençales* (1844); *Histoire des Rois francs* (1847); *L'Enseignement obligatoire* (1859); *La Question d'Or* (1860); *Questions Contemporaines* (1863); *Études et Essais* (1869); *Les Formes du Gouvernement dans les Sociétés Modernes* (1872); *De la Propriété et ses Formes Primitives* (1874); *Le Protestantisme et le Catholicisme* (1875); *L'Afrique centrale; L'Italie actuelle* (1881). He is a moderate liberal in politics, a moderate protectionist in political economy, a clear writer, and a deep thinker.

See Vol. XIV. p. 355 Am. ed. (p. 354 Edin. ed.).

LAW. The word law is used in many senses, as the law of God, the laws of nature, the laws of health, the law of honor, etc. We speak of it here in the sense of the law *par excellence*—the law of a country or state, the law of civil society. As such it is better described than defined. If one must have a definition, we may say that it consists of those rules and regulations which are laid down by the authorities of a state for governing the conduct of its citizens, and which are enforced by the civil power; or, varied a little, we may say law is that body of rules and regulations which the people of a particular country or territory adopt and enforce for the establishment and maintenance of civil government, the preservation of social order, the distribution of justice, and the advancement of the general good; or, yet again, we may say it is that body of rules which a political society enforces by physical power for the protection of its members in their persons and property, and the promotion of their happiness.

Any rule of conduct which is not enforced by the physical power of society is not law in the sense in which we are using the term. It may be a rule or law of morals, or of courtesy, or of honor, but it is not Law, that is, Civil Law. In the article Government we had occasion to say that Civil Society, Government, and Law are so closely related to each other that one cannot exist without the other: there can be no civil society without law, and there can be no law without government; in other words, it is of the essence of civil society to be governed by rules that are enforced, and rules cannot be enforced without some agency to enforce them, and that agency we call Government. The true definition of civil society is a collection of human beings within the bounds of a distinct territory, organized under a form of government, and regulated by rules which that government enforces with the whole power of society.

This definition results from the very nature and idea of civil society. Society alone is a mere consorting of men together under voluntary rules, and he who breaks the rules is simply expelled. But *civil* society is society organized into a civitas, or state, wielding the concentrated power of the whole body, and involving the idea of a government, of the use of forces, and of compulsory laws.

It is very clear, as a matter of fact in human nature, that our definition of civil society must be accurate, for civil society could not exist a day without law, any more than the universe could hold together without gravitation. A voluntary society, without the use of physical power in the enforcement of rules, would incontinently drop to pieces.

The instincts of selfishness and greed, the excitement of passion, and the blindness of judgment where one's own interest is concerned, would result in speedy anarchy and the success of the strongest. If men and women were angels, it might be different; but then the law written in their hearts would supersede the necessity of civil law.

The rules by which civil society, as we have defined it, is regulated constitute the *law* of that society. It matters not how that law originated, whether it was prescribed by an autocrat or by a legislative body, or was adopted by the mass of citizens in general assembly, or arose from mere custom and usage, or from the decrees of the courts—if the physical power of society is put forth for its vindication and enforcement, it is law; if not so enforced, it is not law. Sometimes, it is true, turbulence may temporarily thwart the execution of the laws and paralyze the power of the state. This produces for the time being a disruption of the bonds of society, and a return to a state of anarchy and brute force; but as soon as the public power is restored and the reign of law returns, civil society and government are re-established.

The laws may be imperfect from whatever source they arise, whether from the breast of a single lawgiver or from the formulated will of the people, or even from custom and usage. But from what has been said, it is manifest that law, perfect or imperfect, is the bond of civil society: it is that which binds society together; it is that which makes it what it is, the guardian and promoter of all that is pleasant in human life; of social advancement, elevation, and happiness. Without law there would be no security. Violence and crime would go unpunished, injuries would be unredressed, the weak would have no protection against the strong. Barbarism, nay, savagism, would be the inevitable lot of mankind. Law is the basis at once of civilization, of intelligence, of refinement, of science, of the arts, of the decencies, of the amenities, of the embellishments of society. It alone makes these things possible.

"At first view, when we walk about amongst our fellow-men, we may not notice the omnipotent and controlling influence of the law. Its power is so subtle and all-pervading that everything seems to take place as the spontaneous result of natural conditions and circumstances. It is like gravitation in the natural world, which, whilst it governs and controls every movement, and produces all the order of the universe, is itself unseen. It must be studied in its effects in order to understand its power. So with law in civil society. It is over, under, in, and around every action that takes place. Its silent reign is seen in the order preserved, the persons and property protected, the sense of security manifested; in the freedom of intercourse, in the cheerful performance of labor, in the confidence with which business is transacted and trust is reposed by one man in another; in the peaceful and contented pursuit of trades and occupations, and the bestowal of services; all goes on cheerfully and smoothly, working out and interworking the constant evolution of human happiness—*because* of the ever-existing (though generally unrecognized) consciousness of the presence, the watchfulness, and the all-sufficient protection of the law. In ordinary conduct conformity to its rules and requirements is pursued almost as a second nature; but in transactions requiring authentic evidence, greater knowledge, perhaps professional skill, is required; and where questions of ambiguity, complexity, and difficulty arise, which the parties themselves cannot amicably solve, then, of course, the skill of the lawyer, and perhaps the wisdom and authority of the judge, must be resorted to. But, compared with the millions of transactions which take place, these ripples on the surface do not often occur. The mighty river of things generally moves on with an undisturbed current; but only because it is kept in its banks and regulated in its course by the power of law."

It thus appears that law is not an abstract subject, lying silent in dead books, only to be drawn out and discovered by students; but that it is a living force, ever active in restraining, regulating, and giving form to society; not of society in general, or in the abstract, but of the particular society which it pervades, and to which it gives order and form. In studying the law of any country, therefore, we necessarily study the form, the spirit, the tendencies, the pursuits, and characteristics of society in that country; and, on the other hand, we cannot closely study any particular civil society in these various aspects without gaining a considerable knowledge of its laws. It is true, that as a matter of curiosity or general history, or as throwing light on the manner in which laws are formed under varying social conditions, a person may find interest in studying the laws of other countries and other ages, such as the laws of the Roman empire, or of the states of Greece; but the greatest interest must ever be found in studying the laws of one's own country, because it involves a study of the social body of which he is a component part, and in which his own happiness and destiny are to be worked out.

We have already hinted at the various sources from which the law may arise. This depends largely on the form of the government. Supposing the frame and form of government (which is the result of the fundamental law) to have been settled by the national will or assent, the remainder of the laws are adopted or prescribed by the law-making power of the state established according to the forms of such constitution. That power may be lodged in an autocrat, or in a select body of men representing or not representing the people, or in the people themselves, as we have explained in the article GOVERNMENT. In free governments (laying pure democracy out of view as inapplicable to large communities) the power of legislation is committed to representatives of the people, subject, however, in some instances, to partial restraints from distinct interests or estates. Thus, in England, the aristocratic interest of the nobility, represented in the House of Lords, has an equal voice in making laws with the representatives of the people in the House of Commons, and can prevent the passage of any law which is not approved; and the Crown has likewise the right to disallow a law passed by both houses—a right, however, which has ceased to be exercised. So, in this country, in the U. S. government, the Senate, which represents the States, has an equal voice in the enactment of laws with the House of Representatives, which represents the people; and the President may disallow or veto a law passed by both houses unless re-enacted by both by a two-thirds vote. This bicameral and presidential concurrence in laws, however, is probably intended as much for the purpose of preventing hasty and inconsiderate legislation as for preserving the separate rights of the States, or the general rights of the Union. It prevails in all or most of the State constitutions, as well as in that of the United States.

What political machinery is best adapted to the production of wise and beneficial laws will probably always be a matter of dispute. In the United States it is the received doctrine that representatives of the people can best understand their wants and what will be for their greatest good, and that such representatives, therefore, are best qualified to judge what laws should be enacted. But this is not conceded by all political writers. Many contend that the people are short-sighted and do not know what is best for the whole body politic, and therefore do not know what is best for themselves. As to this, of course, much will depend in any given case on the degree of development and enlightenment to which the people have attained.

It may be laid down as a postulate that law must be founded in reason and justice. Men, unless they are slaves, will not endure that their rights of person and property shall be regulated by unjust and inequitable rules. If their laws are not absolutely just and equitable, they must at least be made to appear so. The very object of society is to secure justice and to protect right. This fundamental principle lies at the basis of all laws; that is, all laws that regulate the mutual rights of men as individual members of the body politic. The government, it is true, may be despotic, supported by military power; and, hence, so far as the public constitution of the state is concerned, the law may be very far from just and reasonable; though this condition of things cannot last when the people become fairly capable of a more liberal form of government. But, whatever the form may be, no government, except where its own interest and support is concerned, can afford to impose unjust laws upon its people. Hence it often happens that the greater the public tyranny, the more careful is the tyrant to provide wise and equitable laws for the people as between themselves. At all events, it is a received maxim in all systems of law that the law is founded in reason and justice. Hence it is that reason and justice are considered law, and if no other rule—that is, no formulated rule—is presented for the decision of a case, resort is always had to the reason of the thing and to the manifest justice of the case.

Another principle regarded as fundamental, and always applied in every community imbued with the spirit of social order, is that every wrong should be redressed by giving to the injured party a proper remedy against the wrong-doer. The remedies given would, in the infancy of society, depend on the sense of justice of the judge, jury, or neighbors; but, after a time, they would settle down according to fixed rules.

A third principle almost equally prevailing and potent as the two former, is that when a question of right and wrong has once been solemnly decided by the judges, the rule of that decision will be followed in like cases subsequently occurring, both from a reverent regard for the opinions of those who made the decision, from the presumption that a question once solemnly considered has been rightly decided, and because it would be unjust to decide differently after the people have been instructed as to the proper rule to be followed. When a case arises presenting a new question, not precisely within any known precedent, the same principle of regard for authority dictates that it should be decided by analogy to such precedents as come nearest to it in character and circumstance; always, however, under the paramount guidance of reason and justice, the clear fountains of the law.

Under the influence of these fundamental principles, always controlling every judgment in the English tribunals, arose what is called the *Common Law*. Starting with a few old institutions and regulations, the origin of which is lost in remote antiquity—such as the rites of marriage, the subjection of children to parental authority until twenty-one years of age, the appointment of guardians to orphans, the division of a deceased person's property amongst his wife and children, and, failing there, amongst his nearest kin, the appointment of judges to decide disputes, trial by a jury of neighbors, the punishment of crimes, injuries, and frauds by penalties and compensation to the injured, the awarding of damages for the breach of covenants and promises; starting from these and such like fundamental beginnings of social order, inherited by every Anglo-Saxon tribe or clan from a more primitive civilization, and forming the ground-work of its simple constitution and laws, and aided by the constant additions of new institutions and instrumentalities of civilization, brought in by the progress and advancement of society in succeeding ages, the common law, under the operation of the principles before referred to, grew up to the vast and noble proportions in which we see it developed in our times.

But the common law is not adequate to all the exigencies of an advanced state of society. Many things must be settled by positive regulations, and many more may properly be settled in that way. Such are the establishment of territorial, municipal, and other jurisdictions, superior and subordinate; of tribunals for the administration of the laws, with all their incidents and powers; of institutions for promoting the general good and maintaining public order, and the regulations incident thereto; the definition of crimes and offences, and their respective grades, and the punishments to be inflicted thereon; the prescription of forms and modes of proceeding in the transactions of business and in the administration of justice; the regulation of estates in land, and property in goods, and the forms of title and conveyance, and the devolution of property by the death of the owner; these, and a thousand other things, for which no rule can be deduced from any principle of justice or equity, but which, nevertheless, require some rule by which they may be done and performed in an orderly manner, are to be regulated and provided for by statutes, ordinances, or other positive regulations of the governing power.

The extent to which the written law shall be carried is, of course, a matter of legislative discretion. Various opinions on the subject are entertained. Some legists would limit it to those matters which require positive regulations, or in which existing laws may be beneficially amended, leaving all other subjects to the plastic rules of the common law; others would abrogate the common law entirely and institute a written code in its stead. Codes more or less complete, prepared by persons of skill and experience, are sometimes adopted by the law-making power; but it is impossible for any man, or set of men, to anticipate all the exigencies that may, and must, arise in the experience of a nation. No code ever did, or ever can, provide for all cases. Large room for the exercise of reason and judgment and the application of the general principles of justice and equity must be left to the tribunals; and their decision will necessarily add to, and supplement, the written rule; and such addition and supplement will become part of the unwritten law. So that, in the presence or in the absence of a code or statute, or other written law, the application of reason and justice to one controversy after another will give rise, in process of time, to an accumulation of adjudicated decisions, growing out of the actual exigencies of society, which will express better than any *a priori* compilation can do the precise rules of law and right best adapted to the conditions of the particular society,

It is apparent, therefore, that no code or system of statute law can prevent, or ought to prevent, the constant growth and expansion of the law, which depends upon the exercise of reason, justice, and common sense. It would be vain and mischievous for the legislator to undertake the formal enactment of the rules of logic, or reason, or justice. How can a principle be the subject of enactment? One man may be more successful than another in stating it; but the very next case arising for its application may require a statement slightly variant, some qualification or restriction not attended to before. No system of law can be practically enforced without the exercise of sense, judgment, reason in its administration and application. Any attempt to shut out, or cut off, this lubricating element of practical justice will not only fail of its object, but will be deleterious in its effects, so far as it goes.

In short, the law does not consist, and cannot be made to consist, of a certain number of iron rules, incapable of adaptation to varying circumstances. Every case calling for its application will be more or less different from every other case, and will require some change, modification, or adjustment in the mode of applying the rule in order that its spirit may be carried out and justice may be done. This is the office and duty of the judge in all systems of judicature; and the varying rules which are evolved by this process become a part of the legal system, and constitute what is called the jurisprudence of the state. This jurisprudence forms a large part of the common law of every country. Being based upon reason and justice as applied to the actual circumstances and exigencies of the particular society, it becomes its most fitting legal envelopment; it exhibits the outward form and body and image of the internal activities and movements of that society; it is like the exterior integument of the human form, which acts as a protection against the elements, preserves every lineament, and clothes the body with beauty and grace.

This flexible and expansive quality of a nation's jurisprudence is not only an interesting, but a highly important and essential feature of the law. It is that by which it grows with the nation's growth, and strengthens with its strength. Throughout the national life this inexorable law will be found to prevail, that as the mutual relations of men in society multiply and controversies increase, the laws will expand to embrace them. If it were not so, anarchy would supervene, and civil society would become disintegrated; for the want of law in any part, like a cancer in the human body, would destroy the whole system. The expansion required may be effected by legislation, by decisions of the courts, or by the force of gradually advancing custom and usage; by one or the other; but it will be effected in some way. It is this law of development in the laws by which civil society is conserved and enabled to advance to higher stages of civilization.

It may be observed, however, that this principle of adaptation and expansion does not depend upon, and does not generally wait for, specific legislation, though often aided and supported by it. It arises from the fact that law is not merely a verbal rule, but is a concrete expression of justice as applied to the transactions of society. As those transactions increase and multiply, they demand, as we have already shown, the enunciation of the same principles in new and modified forms. If a new instrument of trade comes into use, for example, a promissory note, it will not be long before general usage and convenience will originate rules and regulations as to its use, and as to the rights and obligations arising upon it, which the courts will sanction as just and reasonable, and which will thus acquire the force of law. If a new mode of conveyance and transportation is invented, for example, a railroad, with its steam locomotives and cars, it will not be many years before, by the judicial application of the principles of justice, already to some degree exemplified in other modes of travel and transportation, a code of railroad law will be built up, answerable to all the requirements of the new circumstances. We have seen this very thing take place in our own times, and could now exhibit to the astonished eyes of our great predecessors, Coke and Hale and Holt, if they were permitted to revisit the earth, almost entire systems of law which they never dreamed of as lying in undeveloped germ in the bosom of that common law which they loved so well; undeveloped then, because the exigencies of society had not yet arisen which required their elimination and announcement. The law thus developed is the intellectual form, the specific idea and image of the progress of society. To stop this expansion of the law would be equivalent to stopping the growth and advancement of society and the very pulse of humanity.

But when this judicial adaptation and expansion of the law becomes too slow for the progress of events, or would require too violent a change, then the legislature interposes and enacts a new law amendatory of, or additional to, the old. Statute law and the natural growth of the common law go hand-in-hand to meet the new exigencies of life and business that are constantly manifesting themselves.

Another fruitful source of law, to which we have not yet adverted, is custom and usage. A large portion of the laws of every country arises from this source. A custom is, of course, based upon the genius, the temper, and the habits of a people. A custom cannot long prevail to any great extent in a community before it comes to be relied on in transactions, even without being mentioned, and at length it becomes highly inconvenient and even unjust to deviate from it, or to allow it to be deviated from. It thus becomes the practical law of the land, and the courts will feel bound by every principle of equity and justice to declare it so, by deciding cases in conformity to it. The jurisprudence arising from this source is also part of the common law.

Still another source of law is the adoption by new and infant states of the general system of law of some older community whose habits and form of civilization is most like their own. Thus, the early settlers of this country, who established the English colonies, brought with them the common law of England; and in their new communities adopted the general statutes of that country so far as they were applicable to their situation and circumstances. These continued to be the law until modified or abrogated by subsequent legislation. The English statutes have, in most instances, been superseded by State statutes, though not in all. But no attempt has been made, except in one or two cases, to supersede the common law by a written code. It would be a perilous experiment to abolish it altogether. In Louisiana a civil code was adopted in 1808, based on the Spanish and French laws which had previously prevailed in the colony; and in 1825 it was revised and made to conform more closely to the civil code of France, sometimes called the Code Napoleon. But when the code fails to furnish a rule, resort is always had to the civil law, as taught by the French writers and schools of jurisprudence, which is really a great fountain of common law.

From this review of the nature and origin of laws, and their expansibility and power of adaptation to the ever extending and varying manifestations of social development, we justly infer that the study of law, or jurisprudence, is a real science. Law does not consist of mere arbitrary rules emanating from a despotic will, which may be one thing or another, according to the legislator's whim. If it were of this character, the knowledge of it could never be elevated to the dignity of a science. But civil law is far other than this. It is one of the natural and inevitable outgrowths of humanity, like language, like society itself. Justice and right, like truth, are the same in all countries and amongst all peoples; and as law is the expression, by every particular people, through its magistracy, of the dictates of justice in reference to the phases of its own experience, it must have a natural origin and growth, similar in all states, only modified by their diversified condition and circumstances. Hence the study of one system of laws, as developed in a particular state, will give us the basis and all the substantial elements of any other system as developed in a different state. Each people may have some peculiar institutions of its own, arising from its peculiar circumstances or genius; as, amongst the warlike tribes of Europe, in the middle ages, land was distributed and held upon the tenure of military service, and was made to descend to the eldest son as the person most capable of performing the service required. Of course the peculiar genius of a people will find expression in their laws; but human nature and the great mass of human actions are essentially the same amongst all peoples, and the dictates of justice under like circumstances are ever the same; and as law is the expression of man's sense of justice in the regulation of civil society, it is not, and cannot be, an arbitrary or empirical set of rules, but is founded upon immutable and eternal principles —the immutable and eternal principles of justice and right. It may differ in mere form and detail in different countries; but it is essentially the same in all, wherever an advanced civilization prevails. It has all the elements, therefore, for forming the basis of scientific study and treatment. Any student who diligently compares the laws of different countries will find the greatest instruction and delight in seeing how closely the lines run together, and how, when they separate, some national characteristic or peculiarity of circumstances almost invariably supply the cause of such separation.

From what has been said about the nature and objects of law, as well as the sources from which it is derived, its divisions and branches or departments will easily be understood. In the first place, the division of the law into written and unwritten law is obvious. *Written law* is that which is formulated in precise and fixed terms, committed to writing and promulgated as absolute law. All statutes enacted by the legislature are of this character, including codes and other bodies of formulated law, and all legislative acts and ordinances of municipal bodies, acting within the scope of their several jurisdictions as prescribed by the legislature or by the constitution. *Unwritten law* is the common law, being that part of the law which has grown up by the decisions of the courts and by custom and usage.

The different departments and branches of the law result from the subjects to which they are directed. The law relating to matters of public concern, such as the form of government, its relations with other powers, the arrangement of the territory into subordinate political divisions, the assignment of power to these divisions, the establishment and administration of public institutions and works for promoting the general good, the provision for the punishment of crimes, and the establishment of tribunals for the general enforcement of the laws, belong to the domain of *public law;* whilst the definition and vindication of private rights, relating to men's persons, reputations, liberties, and estates, and the redress of private wrongs inflicted by one individual upon another, belong to the domain of *private law.*

In the department of public law are comprised several distinct branches of law, independent of each other, and requiring separate treatment and study. These are International Law, Constitutional Law, Administrative Law, and Criminal Law.

International Law consists of those rules, dictated by natural justice, by long usage, or by treaties, which form the law of intercourse between the state or nation and other states or nations. Though international it is enforced by each individual nation as its own law, there being no common judge to enforce it. And each nation, on its own responsibility, puts its own construction upon the law, at the risk of a conflict with other nations if they should construe it differently. This law is to be found in the works of those sages of the law who have made international law their special study, and who have become generally recognized as authorities. They are called publicists, because international law is regarded as public law *par excellence.* Of this class are Grotius, Puffendorff, Bynkershoek, Vattel, Wheaton, Phillimore, and others.

The idea of Mr. Austin that international law (so called) is not law, because not imposed by a common superior with power and will to enforce it, is not tenable, and if it were, it is a useless cavil, for this law is in fact enforced by the sanctions of non-intercourse, confiscation, reprisals, and war, which are as effective in swaying the conduct of nations as ordinary punishments are in swaying the conduct of individuals. (See INTERNATIONAL LAW in ENCYCLOPÆDIA BRITANNICA.)

There is a branch of international law which is called Private International Law (sometimes treated of under the title of Conflict of Laws), which has respect to the rights and duties of persons who have relations personal or by means of property or contract with different countries, whose laws conflict with each other in reference to the matter in hand; and it is the office of private international law to determine, according to the principles of justice, what rule should be followed. Ordinarily every man's rights and duties are determined by the law of the place where he resides. But he may be the subject of some other sovereign claiming his allegiance, or he may own property located in another country, or he may have contracts made or to be performed there; and it is the province of private international law to determine his rights and duties in all these cases. The validity and effect which shall be accorded in one country to acts done in another, such as transferring property, recovering judgments, constituting executors, guardians, etc., is a matter of comity between the two countries and their tribunals; and private international law determines when this comity should be exercised. On this subject the student may consult the works of Savigny, Story, and Wharton.

In this age, when the Atlantic Ocean has become a mere ferry, and foreign intercourse is so common, and still more in the United States, where forty independent communities are so closely related by business connections of every kind, this branch of international law has become of great importance. (See also INTERNATIONAL LAW, PRIVATE.)

Constitutional Law prescribes the form of government of a state, its general departments, and their functions; the political divisions of its territory, and the duties and powers assigned to each; the various kinds of delegates and officers to consult for the public good and execute the public will, and the modes of appointing them; in other words, the framework of civil society and the functions of its several parts. The constitutional law of a country is sometimes written, sometimes unwritten, and sometimes partly the one and partly the other. In this country it is mostly written, partly in a direct and formal act of the people, under the name of a constitution, and partly in organic laws passed by the legislature, extending the organization of the body politic to details which are not provided for in the outline drawn by the constitution itself. Whatever law relates to a public function is constitutional in its character, whether it defines the powers of a governor or a constable, or directs the mode of passing laws or of exercising the elective franchise. It touches the organization of the body politic, and that organization is, subjectively, the constitution of the state.

Administrative Law is that which provides for the establishment and execution of those public institutions and works which are created or carried on for the benefit and protection of society, such as armies, navies, fortresses, sea-walls, light-houses, harbors, piers, bridges, highways, railroads, canals, mails, prisons, hospitals, poor-houses, asylums, universities, schools, and benevolent corporations, all of which exhibit the majesty of the body politic in the energy of beneficent action, aiding, protecting and benefiting all its members, and advancing human civilization. This subject is largely discussed by the French lawyers as a separate branch of public law, and some of their works are well worth the student's consideration. Laferriere's Treatise on *Public and Administrative Law* is a model of clear analysis, and is well worthy of being done into English and studied in our legal institutions. A compendious elementary work on administrative law in this country would be of great service to our students of law.

Criminal Law is that branch of public law which defines and provides the proper punishment for crimes as distinguished from private wrongs. *Crimes* are those more heinous breaches of the law which are regarded as offences against the public peace or safety, and therefore proper to be prosecuted by the public authorities; whereas private wrongs are those minor injuries to individuals, called civil injuries, which may well be left for prosecution to the persons so injured. Of the former are treason, murder, manslaughter, robbery, malicious injuries to the person, arson, burglary, theft, etc. Private wrongs, such as injuries to person or property, arising from wilfulness or negligence, and not amounting to crimes, deceits, frauds, breaches of promises, covenants, and agreements, etc., belong to the domain of Private Law.

Private Law consists of those civil rules and regulations which govern the private actions and mutual relations and dealings of all citizens, and all other persons subject to the jurisdiction of the state. When we consider the innumerable relations and transactions which take place among men in society, it is apparent that the laws must necessarily be extensive and voluminous. In the simple times of old a few rules might have been sufficient, but in the present complex state of society, having so many industries, occupations, and interests, and presenting so many phases of human life, all requiring the protection of the laws, it is indeed wonderful that the civil law can be so all-embracing and omnipresent as to reach and provide for every exigency that may arise. But it does this, and does it perfectly. It does it by means of a rigid and accurate classification of human relations and acts—a classification based partly on nature, partly on custom, and partly on instituted or voluntary conditions. The most striking natural relations are those of husband and wife and parent and child; custom early established those of master and servant and guardian and ward, and that of magistrate and people grows out of the very construction of society. But there are innumerable relations which men voluntarily or involuntarily assume towards each other, either by conduct or by contract. If one injures another in person, reputation, or property, the relation of injurer and injured is established between them, imposing upon one the duty of satisfaction for the injury, and giving to the other the right of demanding it. If two or more enter into a contract they mutually assume a contractual relation towards each other, binding each to the others for the performance of his part of the contract, and a failure to perform involving the duty of satisfaction and the right to demand it. This is a mere general statement of what occurs every moment; but the variations of right and duty growing out of the infinite variety of facts and shades of difference in the many cases that occur, render the complicated mass of rules and principles necessary to meet and provide for all, forbidding to the beginner in the study of the law. He must learn well the great principles of justice, and the system of legal analysis and classification, and light will begin to break in upon the chaos, and all things will at last become easy and plain.

It is evident that in the domain of private as well as that of public law there must be many branches capable of separate consideration, according to the subjects upon which the law is brought to bear. We can give only a bare enumeration of some of the principal. One branch naturally relates to personal rights and duties, including the rights of personal security and personal liberty, and those growing out of private relations. Another branch relates to the rights of property—property in land and property in goods; the one constituting the subject of the law of real estate and the other that of personal property. Then there is the law of contracts, and each contract may receive separate consideration, as the law of sale, the law of bailment, the law of agency, etc. So that, as is apparent, a practical analysis of the law is coincident with, and is based upon, an analysis of the subjects to which it is applied; or, in other words, an analysis of civil society, and all the transactions that take place in it.

Through all the departments of the law, however, there is involved, if not formally developed, the threefold division into *Rights, Injuries, and Remedies.* The law of remedies, or the law of procedure, is of so peculiar a character, and so necessary for carrying into effect all other laws, that it demands not only separate treatment, but extra attention on the part of the student, who should make himself thoroughly familiar with both its principles and details.

The reader of this brief and imperfect article cannot fail to have observed that a knowledge of the law requires a knowledge of affairs, and that a lawyer must be a man of affairs. The student who is inclined to become a bookworm, and a recluse, had better abandon the law as a profession. The subject of his science is in the world around him, in society, in its actual constitution, in its institutions, in its practices and customs and habits. Instead of shutting himself up from the world, he should be wide awake, and should, with open eyes, watch the great drama of human life which is being acted in his presence. Books, of course, are to be studied, and that profoundly; but not to the exclusion of that other learning which can only be obtained from observation and mingling freely with our fellow-citizens.

Another idea should always be borne in mind by the student of the laws ambitious to excel in his profession. It is deduced from the very nature of law, and is the verdict of wide experience, and is this: personal character is no less essential than large attainments to make a good lawyer. Learning is not enough: judgment and sound sense are necessary, and the judgment must be formed and inspired by the principles of rectitude. The truly great lawyer must have three prime qualifications: great learning, great intellectual grasp, and high moral principle. For the law is concerned with all human affairs, and is the expression of reason and justice as applied to them. Hence, Ulpian well says: "*Jurisprudentia est divinarum atque humanarum rerum notitia, justi atque injusti scientia.*" Papinian, though cut off at the age of thirty-six, achieved immortal fame as a lawyer. And how was this possible? Because the law is not a mere library of books, requiring a lifetime of study to acquire it; but, as before said, it is justice applied to human affairs. A great and good man masters it almost intuitively. Such men are the exceptions, it is true, but they indicate tendencies and demonstrate causes. They show that the true lawyer must be something else than a pannier mule, carrying a load of learning. A bad man, however learned or intellectually acute, will often be at fault when the question is one of justice and right. A man of pure and high character not only sees the right clearly, but himself commands respect, and his words carry conviction. Prof. Matthews, in *Getting on in the World*, profoundly remarks: "The impression which every person, whether on the platform or in conversation, makes on his fellows is the moral resultant, not of what he says but of what he has grown up to be; of his manhood, weak or strong, sterling or counterfeit; of a funded but unreckoned influence, accumulated unconsciously and spending itself, according as the man is deep or shallow, like a reservoir, or like a spout or an April shower."

Literature.—Hooker's *Ecclesiastical Polity,* Book I., sec. 10; Bacon's *De Augmentis Scientiarum,* Book VIII., chap. 3; Hobbes' *Leviathan,* chap. 26; Locke *On Civil Government,* chap. 11.; Blackstone's *Commentaries,* Introduction, sec. 2, and Com., chap. 1; Wooddeson's *Lectures,* the preliminary part; Wilson's *Lectures,* Vol. I.; Austin's *Province of Jurisprudence Determined,* and *Lectures on Jurisprudence;* Bowyer's *Universal Public Law;* Sir H. S. Maine's *Ancient Law, Early History of Institutions,* and *Village Communities;* Herbert Spencer's *Political Institutions,* chaps. 2, 14; Lieber's *Political Ethics,* Book II., and *Civil Liberty and Self Government,* chaps. 18, 19, 20; Holland's *Elements of Jurisprudence;* Wharton's *Commentaries on Law;* Savigny's *System des heutigen Römischen Rechts,* Book I. (J. P. B.)

LAWES, SIR JOHN BENNETT, BART., an eminent English agricultural experimenter, was born at Rothamsted, near St. Albans, Herts, Dec. 28, 1814. He was educated at Eaton and at Brasenose College, Oxford, and afterwards studied chemistry in London. Inheriting the estates of his father, Mr. John Bennett Lawes, of Rothamsted, he began in 1834 those experiments upon the methods of the raising of farm-crops and the effects of different fertilizers, and on other topics connected with rural economy. These experiments have made his name a household word in every part of the world where agriculture is conducted in a scientific manner. In this work he had the aid of the eminent chemist, Dr. Joseph Henry Gilbert, who became associated with Mr. Lawes in 1843, and the association still subsists (1886). The results of the admirable labors of these two distinguished gentlemen have been published in an extensive series of reports and papers which are everywhere acknowledged as of the highest practical value. They also have conducted important experiments in the feeding of live-stock, in animal and vegetable physiology, on drainage and sewerage, and in other departments of rural economy. Mr. Lawes was made a baronet in 1883 as a public acknowledgment of the importance of his work. He has endowed his agricultural station with £100,000.

LAWN [Old English, *laund,* probably the same etymologically as *land*]. In our older literature this word usually designates an open glade in a forest, but it has come to be chiefly used as the name of an ornamental grass-plot situated in front of or near a mansion or dwelling. The house-lawn should be carefully graded, but not always reduced to a dead level. Slopes and undulations are to be desired, especially if the lawn has much extent. The first requisite for a good lawn is a good soil. This should be well raked and made fine to a considerable depth. Deep trenching is a good preparation, especially if the soil be heavy. Underdrains of porous tile are always useful. Stable-manure tends to produce coarse herbage. Raw bone-dust, phosphates, and kainit, or other potash salts, may be worked in before finishing the surface; but after the grass is once established strong and stimulating fertilizers must be applied, if at all, with great caution. In early spring a weak solution of nitrate of soda, not over one pound to the gallon of water, will have a happy effect. To obtain a fine, velvety lawn frequent clipping and rolling are necessary. The lawn-mower is admissible on large expanses of grass; but the grass-hook or sickle, properly handled, will give better results on small plots. The quickest way to get a good sod is to cut the turf and transplant it to the lawn. But in this way coarse weeds and coarse grasses are transplanted as well. The best way is to sow good seed on a good soil. If the soil is very sandy one will have hard work to make the young grass survive our hot American summers, even with abundant irrigation. What is sold as "lawn-grass" seed is usually a too costly mixture of various sorts of grass-seeds. The cheap and excellent seeds of ordinary red-top are as serviceable for lawns as any kind. Some recommend the seed of *Anthoxanthum odoratum,* or vernal grass, as an ingredient. This is costly, but it starts early in spring, and when clipped and withered the grass emits a delightful fragrance. (C. W. G.)

LAWRANCE, John (1750–1810), an American statesman, was born in Cornwall. England, in 1750. He removed to New York in 1767, and was admitted to the bar in 1772. He was aide-de-camp to his father-in-law, Gen. McDougall, in 1777; and as judge advocate-general he took part in the trial of Major André. After the close of the war he practised law in New York. In 1785 he was elected to Congress, but after a defeat in 1788 again appeared in 1789 as representative for New York city, and supported the measures of Hamilton, his personal friend. In 1794 he was made U. S. judge for the New York district, and in 1796 was elected to the U. S. Senate, over which he presided in 1798. At the close of Pres. Adams' administration he retired from public life. He died at New York in November, 1810.

LAWRENCE, a city of Kansas, county-seat of Douglas county, is finely situated on the Kansas River, chiefly on the S. bank, 29 miles E. by S. of Topeka. It is on the Union Pacific, the Atchison, Topeka, and Santa Fé, and the Southern Kansas Railroads, and is the terminus of two branch railway lines. The State University, situated on Mount Oread, within the city limits, is a large and prosperous institution. The city has a court-house, numerous banks and newspapers, churches of all the prominent denominations, an excellent system of public schools, a large trade, and varied industries. The manufacturing advantages of Lawrence are excellent, the river affording a good water-power, utilized by means of a dam. Pork-packing and the manufacture of carriages, flour, wooden-ware, castings, and furniture are leading pursuits. Lawrence was founded in 1854 by Free-soil immigrants, and not long after was burned by a party of "border ruffians." In 1863 it was pillaged and in part burned by Quantrell's guerilla force. Population in 1880, 8510.

LAWRENCE, a manufacturing city of Massachusetts, one of the seats of justice of Essex county, is situated on both banks of the Merrimack River, 26 miles N. of Boston. The principal part of the city is on the N. side of the river. It is connected with Boston by the Boston and Maine and Boston and Lowell Railroads, and with Manchester, N. H., by the Manchester and Lawrence Railroad. Branch railways extend to Lowell and Salem, and a street railway from Methuen to North Andover passes through the city. Two railway and two highway bridges cross the river. Lawrence has a court-house, jail, city-hall, 3 hotels, 4 national banks, 3 savings banks, 3 weekly and 2 daily newspapers, 28 churches, a large public library, a high-school, and effective systems of public and Roman Catholic graded schools. It is lighted by gas and electricity, and is supplied with water from the Merrimack. The sewerage system in the densely settled part of the city is very complete. Lawrence is one of the great manufacturing centres of New England. The river is here crossed by a stone dam which affords great water-power. Power is supplied to the mills by means of canals on either side of the river, but that on the N. side is much the more important. Some of the mills rank among the largest in the world. A very great variety of woollen and cotton goods, steam-engines, machinery, paper, and other goods are produced here. The town was incorporated and the dam built in 1845, and was chartered as a city in 1853. The population in 1870 was 28,921; in 1880, 39,151, more than half of foreign birth or parentage.

LAWRENCE, Abbott (1792–1855), an American merchant, was born at Groton, Mass., Dec. 16, 1792. At the age of sixteen he was apprenticed to his brother Amos in Boston, and in 1814 became his partner in the sale of cotton and woollen goods. In 1830 they became the selling agents of the Lowell manufacturers. Abbott was an advocate of protection to American industries, and in 1834 was elected to Congress, where he served on the committee of ways and means. He served again in 1839–41, and in 1842 he was a commissioner on the North-east boundary. He was an earnest supporter of the Whig party, and in 1848 was a prominent candidate for the Vice-Presidential nomination. He declined a seat in Pres. Taylor's cabinet in 1849, but became U. S. minister to Great Britain and served until 1852. He founded the Lawrence Scientific School of Harvard University, established many prizes and scholarships in the public schools, and liberally aided other educational institutions. He died at Boston, Aug. 18, 1855.

LAWRENCE, Amos (1786–1852), an American merchant, was born at Groton, Mass., April 22, 1786. After being clerk in a country store he went to Boston in 1807 and became a dry-goods merchant. On Jan. 1, 1814, he formed a partnership with his brother Abbott, which was highly prosperous. From 1831 to the close of his life he devoted himself chiefly to deeds of charity, giving liberally to educational institutions in various parts of the country. He also founded and maintained a child's infirmary at Boston. For the completion of the Bunker Hill Monument he gave $10,000. His private charities were also abundant. He died at Boston, Dec. 31, 1852. His *Diary and Correspondence* were published by his son, Dr. W. R. Lawrence (1855).

LAWRENCE, James (1781–1813), an American captain, was born at Burlington, N. J., Oct. 1, 1781. He entered the navy as midshipman in 1798, and was made lieutenant in 1802. He took part in the war with Tripoli, and in 1810 was placed in command of the Hornet, 18 guns. In it he captured, Feb. 24, 1813 the British sloop-of-war Peacock, 18 guns, after a brief engagement. On his return to New York with several prizes he received the thanks of Congress and was made captain. He was also placed in command of the frigate Chesapeake at Boston, which had just returned from a cruise. While she was lying in President roads, the British ship Shannon, Capt. P. V. Broke, appeared in the harbor, and though Lawrence had not had time to become acquainted with his crew and officers, he felt compelled to accept the implied challenge. Each ship had 48 guns, and in other respects they were nearly equal. The engagement took place June 1, about 35 miles from Boston; it was a severe conflict, but within 15 minutes Lawrence was shot through the body. As he was borne below, mortally wounded, he cried out, "Don't give up the ship," but it was impossible to make further resistance. The Chesapeake was captured and carried to Halifax, its loss being 48 killed and 98 wounded, while the Shannon had 23 killed and 56 wounded, Capt. Broke being among the latter. Capt. Lawrence died June 5, 1813.

LAWRENCE, William Beach (1800–1881), an American jurist, was born at New York, Oct. 23, 1800. He graduated at Columbia College in 1818, studied law, and after a visit to Europe was admitted to the bar in 1823. He was secretary of legation at London in 1826, and afterwards *chargé d'affaires*. In 1828 he went to Paris, and on his return to New York delivered lectures on political economy in Columbia College. He soon attained prominence as a lawyer, and he also was active in constructing the Erie Railway. In 1850 he removed to Newport, R. I., and in 1851 was elected lieutenant-governor of Rhode Island and was acting-governor. He exerted himself to procure abolition of imprisonment for debt, and also to prevent the passage of a prohibitory liquor law. He was a member of the Constitutional Convention of 1853. On the death of Henry Wheaton in 1848 Mr. Lawrence undertook to edit Wheaton's *Elements of International Law* for the benefit of the author's family. This edition was published in 1855, and another in 1863. Mr. Lawrence was a member of the Social Science Congress at Bristol, England, in 1869. He was busily engaged at Washington for several years as advocate in cases of international claims. In 1872–73 he delivered a course of lectures on international law in Columbian College, Washington. He died March 26, 1881. His works include *History of the Eastern and North-eastern Bounda-*

ries of the United States (1841); *Law of Charitable Uses* (1844); *Visitation and Search* (1858); *Commentaire sur les éléments du droit international* (1870); *Treaty of Washington* (1871); *Disabilities of American Women Married Abroad* (1871); *Indirect Claims of the United States under the Treaty of Washington* (1872); *Belligerent and Sovereign Rights as Regards Neutrals* (1873); *Administration of Equity Jurisprudence* (1874).

LAWYER. See ATTORNEY.

LAYARD, SIR AUSTEN HENRY, D. C. L., an English explorer and diplomatist, was born at Paris, France, March 5, 1817, of English parents. After spending some years at Florence, Italy, he studied law in England, but in 1839 set out on an extensive tour, passing through Northern Europe to Constantinople, where he was for a time a correspondent of a London newspaper. He learned Arabic and Persian, and travelled widely in the Turkish empire. In 1842 he explored the antiquities of Susa, and passing through Mosul was attracted by the results of the excavations of the French consul, M. Botta, at Khorsabad. Returning to Constantinople he obtained the promise of aid from Sir Stratford Canning in his proposed researches. His excavations, begun in September, 1845, brought to light in a few years those marvellous records of the past which have revolutionized ancient Oriental history. The treasures thus unveiled were carefully transferred to the British Museum, where they hold a conspicuous place. The full account of Mr. Layard's researches is contained in his *Nineveh and its Remains* (1849). The British government having made him an attaché to its legation at Constantinople, he undertook further researches which are described in his *Discoveries amid the Ruins of Nineveh and Babylon* (1853). Besides these descriptive works he published two volumes of engravings and a volume of inscriptions. In 1852 Mr. Layard was elected to Parliament, and for a few weeks was under-secretary of state for foreign affairs under Lord John Russell. In 1853 he went to Constantinople with Lord Stratford de Redcliffe, but disagreeing with his chief returned to England. In 1854 he visited the Crimea and on his return demanded a parliamentary committee of inquiry into the state of the army, and gave important testimony before it. In 1855 he became a leader of the Administrative Reform Association. In 1858 he visited India to investigate the Sepoy insurrection. Having re-entered Parliament in December, 1860, he was made under-secretary of state for foreign affairs in Lord Palmerston's second administration and retained this office until June, 1866. Under Mr. Gladstone he was made chief commissioner of works in December, 1868. In November, 1869, he was sent as minister plenipotentiary to Madrid, where he rendered important services to his country during the troubled state of affairs in Spain. In April, 1877, at the close of the Russo-Turkish war, Lord Beaconsfield selected him, though a liberal, to serve as ambassador at Constantinople. He retired from this post in 1880.

LEA, HENRY CHARLES, an American author, was born at Philadelphia, Sept. 19, 1825, being son of Isaac Lea. At an early age he displayed fondness for chemical science; afterwards he assisted his father in his conchological researches. Still later he undertook historical investigations of society in the Middle Ages. He also succeeded his father in the book-publishing business, which he conducted on a large scale, giving attention chiefly to medical books. During the civil war he took prominent part in organizing a municipal system of bounty for recruits, and afterwards in promoting municipal reform in Philadelphia. His researches in mediæval civilization have resulted in three volumes: *Superstition and Force: Essays on the Wager of Law, the Wager of Battle, the Ordeal and Torture* (1866; 2d ed., 1870); *Historical Sketches of Sacerdotal Celibacy* (1867); *Studies in Church History: The Rise of the Temporal Power, Benefit of Clergy and Excommunication* (1869).

LEA, ISAAC, an American conchologist, was born at Wilmington, Del., March 4, 1792, of Quaker stock. While engaged in mercantile pursuits he devoted his leisure to natural science, especially geology. In 1815 he became a member of the Philadelphia Academy of Natural Sciences, and from 1853 to 1858 he was its president. From 1821 to 1851 he was a partner with his father-in-law, Mathew Carey, in the book business. In 1827 he commenced the publication of a series of memoirs on fresh-water and land mollusks. His collection of unionidæ contains 10,000 specimens. He read before Philadelphia societies more than 150 scientific memoirs. Among his publications are *Contributions to Geology* (1833); *Fossil Footmarks* (1853); *Observations on the Genus Unio*, and some others. In 1884 he entertained the American Association of Science and their guests of the British Association at his residence at Long Branch. He still continues his studies in natural sciences. In 1886 N. P. Scudder prepared a sketch, biographical and bibliographical, of Dr. Lea, which was published by the Smithsonian Institution.

See Vol. XIV. p. 374 Am. ed. (p. 374 Edin. ed.).

LEAD, a metal of very considerable industrial importance, its softness and the low temperature at which it melts being highly valuable properties. The former property permits it to be easily rolled into thin sheets, and drawn into the form of tubes and pipes, while the latter renders it specially suitable for the manufacture of shot and bullets. It is largely employed in roofing, alloyed with antimony in type-founding, and alloyed with the equally fusible metal, tin, in making solder. It has various other common uses, one being its employment in chemical manufacture, vessels of lead greatly resisting the action of acids. As employed in cisterns, lead pipes, etc., it is somewhat dangerous, since it yields a poisonous solution through the action of standing water. The lead itself is not soluble, but there is formed a soluble hydrated oxide. There is no danger in short lead connections with free-running water.

The chief ore of lead is galena, a compound of lead and sulphur ($Pb\,S$), whose bluish color and metallic lustre give it much the appearance of lead itself. Lead carbonate ($Pb\,CO_3$) is also an important American ore, its association with silver in the mines of Nevada, Colorado, and other States rendering it of high value. It seems to have been derived from galena, which is always present with the carbonate. Galena is very extensively distributed throughout the United States. There is scarcely a State that does not contain deposits, many of which have been worked, though profitable mining has been confined to a few States. The most extensive and valuable deposits of galena are those of Missouri, Illinois, Iowa, and Wisconsin. It occurs here in limestone, in irregular deposits or veins. The lead-ore deposits of Missouri extend over an area of 3000 square miles, in the northern portion of the State. The ores of Wisconsin, Iowa, and Illinois cover a yet more extensive area. The ore here is very easily extracted, the mines not being more than 25 or 30 feet deep. The smelting of galena is a simple process. It consists essentially in the driving or burning away of the sulphur by heat, though several reactions, which need not be particularized, occur in the process.

Until 1872 all the lead product of the United States was obtained from non-argentiferous galena. In that year the treatment of the argentiferous carbonate for silver began, with the result of a very considerable addition to the lead product. Abundant deposits of lead carbonate, rich in silver, were discovered at Leadville, Col., and at Eureka, Nev., and these have since been diligently worked for their silver, the lead being extracted as an adventitious product. The reduction of carbonate of lead is a simple process, and is very easily performed. The main difficulty is to get rid of the iron, antimony, silver, and other metals which are intimately mingled with the lead product. The process now ordinarily employed in the United States to extract gold and silver from lead bullion is that invented by Parkes. It is based on the fact that zinc strongly tends to alloy with gold and silver, but only slightly so with lead. Thus when it is added to the melted bullion an alloy of zinc, gold, and silver is made, from which the lead can be readily separated.

The total lead product of the United States from 1825 to 1884 inclusive was 1,873,134 short tons. The annual product has very greatly increased since the working of lead ores for silver began. Thus in 1870 the product of the galena mines was 20,000 tons. In 1872 there were produced 42,540 tons, 20,159 of which were desilverized. In 1884 the product had risen to 139,897 tons, of which 119,965 were desilverized. The product of the non-argentiferous mines continued nearly the same, being no greater in 1884 than in 1841. The estimate of the lead product from various localities for 1884 (not exact) is given as follows: Utah, 28,000 short tons; Colorado, 63,165; Nevada, 4000. The latter State has greatly decreased in yield, its product in 1881 having been 12,826 tons. Of the Colorado product, 35,296 tons came from Leadville. Of non-argentiferous lead the mines of Missouri, Kansas, Illinois, and Wisconsin yielded 19,676 tons, of which 17,416 came from Missouri and Kansas. Virginia yielded 256 tons. The several remaining States and Territories of the silver-mining region yielded about 25,000 tons. In consequence of this great increase in the lead product the price has essentially fallen. In 1870 the New York quotations were 6.25 cts. per lb. In 1884 they were 3.70 cts. The lead importation has fallen to an insignificant figure, America having risen to the position of the principal lead-producing country. In 1871 the lead import was valued at $3,734,045. In 1884 it had sunk to $88,030. The export changed from $79,880 in 1871 to $135,156 in 1884. The world's product of lead in 1883 is estimated at 454,628 metric tons, of which the United States yielded 139,836 metric or 143,957 short tons. The English lead product has been decreasing, that of Germany steadily increasing, while that of Spain has rapidly increased since 1878.

In addition to the commercial uses of lead already mentioned the white carbonate of lead is an article of high value. Under its title of "white lead" it forms the most essential of all pigments. It is produced by treating the metallic lead with dilute acetic acid, and its manufacture is an important American industry. In 1884 about 65,000 tons of white lead were manufactured here, the price varying from 4½ to 5½ cts. per lb. for the dry pigment. The importations of white lead have declined from 6,636,508 lbs. in 1867 to 902,281 in 1884. Red lead or minium, an artificial oxide of lead, is also largely used as a pigment and for other purposes. No estimate of the product is given. In addition to the uses of lead above mentioned it is a valuable ingredient in the manufacture of fine grades of glass. Its use in this industry dates to the seventeenth century. It was first used as a flux, and was in this manner found to yield that most brilliant and beautiful of glasses, English flint, which is now largely manufactured. Lead-glass is dense and less liable to break from change of temperature than other grades. It is soft and easily worked, and is only excelled in brilliancy by the diamond. It has been employed for a long time in the manufacture of imitative jewelry.

LEADVILLE, a mining city of Colorado, county-seat of Lake county, stands in a narrow valley between Mount Elbert on the W. (a peak of the Continental Divide) and the Mesquite range on the E., 70 miles S. W. of Denver, but 151 miles by the Union Pacific Railroad and 277 by the Denver and Rio Grande. The town-site is 10,200 feet above sea-level, and the mountains near at hand reach the height of nearly 15,000 feet. It has a court-house, a jail, an almshouse, 2 weekly and 2 daily newspapers, 7 churches, an opera-house, and 4 school-buildings. Leadville is one of the most important localities in the world for the mining and reduction of ores of the precious metals. It has numerous large smelting-works, and stamp-mills for reducing the ores, water-power being obtained from a large reservoir fed by mountain-streams. Placer claims were worked here for gold as early as 1860; in 1877 the abundant brown sand of the locality was shown to be highly argentiferous, and in 1878 the town was incorporated. In 1886 the deepest mines are down some 700 feet. The ores are of various grades, the product per ton ranging from $1000 to $2500. The silver, gold, and lead are mostly run out together and shipped to other points to be refined. The city is gas-lighted and has an excellent water-supply. The fire and police departments are well organized, and some of the streets are macadamized with slag. The population in 1880 was 14,820.

See Vol. XIV. p. 380 Am. ed. (p. 380 Edin. ed.).

LEATHER. All kinds of animal skin may be converted into leather by the agency of a large number of vegetable, mineral, and fatty substances possessing tanning or tawing properties. The most important of the mammalia form the usual commercial sources of supply from which the skins used in the manufacture of leather are derived.

In the United States hemlock bark (*Abies canadensis*) is the most important tanning material; it is used for low and medium grades of sole- and upper-leathers. Oak barks from *Quercus monticola* of Michaux, rock chestnut oak, and *Q. tinctoria*, yellow-barked oak, are used for the best classes of leathers. Leather tanned by a mixture of hemlock and oak barks is termed "union tannage." Sumach is used for tanning goat- and sheep-skins in the manufacture of Morocco leather, and also in connection with hemlock liquor in tanning grain, split, and buffed leathers. The varieties of sumach used are American, *Rhus canadense* and *R. glabrum*, and Sicilian, *R. coriaria.* Tanning extracts prepared from oak and hemlock barks, and from wood, are also employed. Catechu, or terra-japonica, is used to a small extent in the United States, but the leather produced with it alone is dark, spongy, and at the same time hard. So-called mineral tanning has made but little progress either in Europe or in the United States. Knapp's process of tanning with ferric salts, and Heinzerling's method of quick tanning with chromates with an addition of aluminium salts, sodium chloride, etc., have received but little attention from practical tanners. Leather prepared with alum, salt, fish-oil, yolk of egg, and flour paste, etc., is said to be tawed.

The preparation of animal skin for the reception of the agent designed to convert it into leather differs so little in the various methods of tanning and tawing that we shall consider all the operations together, and at the same time note such deviations as occur in the preparation of the special varieties of leather.

Soaking and Softening.—Green hides and skins are first freed from the parts which cannot be utilized for leather, such as hoofs, horns, etc. To remove adhering dirt and blood and also for the purpose of softening them hides and skins are soaked in vats containing clear, cold water, the duration of the soaking depending upon the season of the year and also upon the nature and condition of the stock under treatment, slaughter hides requiring a shorter time than do either salted or dry. Insufficiently soaked hides and skins never furnish thoroughly tanned leather, and should they be too quickly placed in lime they cannot have the requisite softness imparted to them by subsequent manipulations. The soaking process, however, must not be continued longer than necessary, as otherwise a portion of the albuminous substances will be withdrawn, and the fibres will lose in quality. Slaughter hides for sole-leather are soaked 3 or 4 days; green-salted "buff hides," *i. e.*, those weighing about 50 pounds and obtained from cows, heifers, and steers, about 4 days;

slaughter calf-skins about 24 hours; dry hides, such as are used for heavy upper-leather, about 10 days; and dry goat-skins for Morocco leather from 3 to 5 days. Soft water is preferred for the manufacture of upper-leather, and hard water for sole-leather. A nearly uniform temperature of the water in summer and winter should be maintained; about 48° Fahr. is the most favorable temperature. Various injuries to the hides and skins originate in the soaking process. The term "prick" indicates an appearance such as would be produced by puncturing the hide with pins, and is produced by soaking too long a time in hot water. "Pitted" indicates an appearance similar to the above, but the holes are larger. "Frieze" is an injury resulting towards the end of the soaking, when the grain is very tender, and imparts an appearance to the hides and skins such as would be caused if the grain was scraped off. "Black spots" are small blotches of dark color, which cannot be removed in finishing. The use of saltpetre—⅛ to ¼ per cent. of the weight of dry hides and the same proportion of green hides—in the water in which the hides and skins are soaked has been used with some success in preventing the injuries just described. After being properly soaked the hides are usually drawn into a pack with the hair side uppermost and are divided into "sides" by a workman who drives a knife from the butt through the centre of the bark.

Dry hides after being soaked are softened in the hide-mill, which is similar to the fulling-mills in woollen factories; dry calf- and goat-skins are softened in a revolving drum termed a "pin-mill," the interior periphery of which is furnished with a number of oak pins upon which the skins fall by force of gravity. The time which the "sides" and skins are worked in the hide-mill or in the pin-mill depends upon their hardness; sides to be made into heavy upper-leather are acted upon for 15 to 45 minutes; goat- and calf-skins from 10 to 30 minutes. The milling of the sides or skins should not be commenced until the fibres are thoroughly softened in the soak, as otherwise they are liable to injury from breaking. To obtain a nearly uniform product hides and skins as nearly alike as possible should be soaked together. Small skins, such as those of kids and lambs, intended for glove leather are softened after soaking by working them over a clean beam with a dull fleshing knife free from rust.

Swelling and Depilating.—Both of these operations are simultaneously executed. By the swelling process a loosening of the cellular substance in which the hair is rooted is so far effected as to allow the hair to be removed by subsequent mechanical manipulation. At the same time the epidermis is also sufficiently loosened so that it can be readily removed. The object of the swelling is, therefore, on the one hand to loosen the separate bundles of fibres cemented together, and to swell the intercellular substance, called coriïn, which lies between them, and on the other hand to destroy the adherence between the hair and the epidermis. The following are the principal methods employed for depilating: by sweating; by liming; by treatment with chemicals, such as sodium sulphide, calcium sulphite, etc. The cold-sweating process is principally used in New York, New Hampshire, and Pennsylvania for depilating hides for sole-leather. This process, it is claimed, yields a better return in weight and considerably lessens the danger of spoiling the hide by the avoidance of putrid fermentation; but by this cold-sweating process it is possible to force the raising too far, which would also cause a loss of substance. Depilation by the cold-sweating process requires about 6 to 12 days, according to the thickness of the hides. The temperature most favorable for raising lies between 46° to 57° Fahr. The cause of depilation by this method must be considered as a fermenting and putrefying process, taking its course at a lower temperature. The badly smelling products of decomposition, which make their appearance during the process, are removed by the quick change of air in the vault in which the hides are suspended, and are, therefore, scarcely perceptible.

Though the cold-sweating process is a hazardous one, it is probably the most rational and best of all methods thus far known, because the putrefying process and the loosening of the cellular matter, in which the hair is rooted, is carried on from the outside to the inside, leaving the grain, in most cases, uninjured, while in all other methods of depilation the loosening of the hide is effected by the agents serving for depilation, be they acids, alkalies, or alkaline sulphides, entering from the flesh side and penetrating, of course, the entire hide to the seat of the roots of the hair.

Depilating by liming is effected by steeping the hides or skins in milk of lime; lime baths of varying strength are generally used. It is customary not to calculate the quantity of lime to be used for a certain number of hides or skins, but to be guided by practical observations. According to some statements, for 100 hides or a proportional number of smaller skins, 4 bushels of lime are used, which is so divided that the first vat contains 2, the second 3, and the third 5 parts. Hides and skins remain, with frequent handlings, in the lime baths until the hair is loosened.

Sodium sulphide during the past five years has been used to a considerable extent in the United States for depilating some varieties of hides and skins. The soaked hides are placed in a 1 per cent. solution of sodium sulphide for 4 or 5 days, with frequent handling, or a solution of 4 per cent. Baumé is poured upon the flesh side of the hides and allowed to act 15 hours for ox-hides and 4 or 5 hours for calf-skins. The depilating process is quickly accomplished with the use of sodium sulphide; the skins are even raised and can later on be freed from an excess of sodium sulphide by treatment with water. Hides and skins depilated with sodium sulphide do not require to be bated the same as though depilated by liming. The opinions of practical tanners greatly differ concerning the value and judiciousness of this method, but there can be no doubt that if used with consideration toward practical conditions it will yield satisfactory results, and especially as a substitute for liming.

A mixture of sodium sulphide with lime has lately been introduced as a new depilatory; but it offers no advantages over the use of sodium sulphide alone. Such energetic agents as calcium sulphide and calcium sulphydrates, contained in by-products, such as gas-lime and residue from the soda-furnace, have also been used for depilating purposes. A combination of lime and orpiment is used for depilating dry flint hides, and is prepared by mixing 9 parts of fresh-burnt lime to a paste with 1 part of orpiment. The paste is diluted with water and applied to the hair side, or the hides and skins are soaked in it until the hair is loosened. The objection to this method is the poisonous properties of the arsenious preparation.

The unhairing of hides and skins after they have been treated with the depilating agent is still commonly accomplished by placing them on the beam and scraping or rubbing off the hair and epidermis with an unhairing knife. But of late years this work has been successfully done by machinery—the McDonald unhairing machine and other contrivances of a similar nature being in practical operation in numerous large tanneries in Salem, Peabody, Woburn, and other points in Massachusetts. Efforts to perform the work of fleshing hides and skins by machinery have been made, but it cannot be said that the result has been entirely satisfactory. The tendency to either "scab" or "slight" the hides or skins is a principal objection to fleshing machines as a class.

Hides and skins to be worked into soft and pliable leathers, after being limed, unhaired and fleshed, and "scudded," are immersed in an alkaline solution consisting of the dung of chickens, pigeons, dogs, or in bran water. This operation is synonymously termed "bating," "graining," "drenching," or "puring," and the object is to neutralize the lime remaining in the pores. The sour liquor in the "handlers" is relied upon to neutralize the lime in heavy hides intended for sole-leather, etc.

TANNING AND FINISHING.—*Sole-leather.*—After being unhaired and fleshed, hides for sole-leather are "plumped" by immersing them in "tailings" or sour tan liquor, the object being to complete the swelling of the cells, distending the pores, and favoring the absorption of the tannin. Some tanners producing low grades of sole-leather hasten the swelling or plumping of the hides by employing dilute sulphuric acid. About 1 part of sulphuric acid to 500 parts of water is used. The plumping takes place in the "handlers" where the hides are suspended in the sour tan liquor, which at first is quite weak, but each day its strength is increased, and in about three weeks the hides will be sufficiently swelled and colored to be placed in the "lay-away vats," when the actual tanning takes place. The hides are placed one by one in the "lay-aways," and upon each hide there is sprinkled a thin layer of bark, in order that the tan liquor may circulate uniformly. Each "pack," usually consisting of about 85 hides, is "laid away," *i. e.*, is supplied four or five times with fresh tan liquor of increasing strength, about five months being required to tan the best quality of oak slaughter sole-leather. When the tanning is completed the hides are divided into "sides" and carried to the scouring-machine where the "bloom" is removed, and afterward the sides are suspended in the drying-loft and after becoming nearly dry they are rolled. Fig. 1 shows the form of sole-leather rolling-machines commonly employed in the United States. After the sides have been rolled the first time they are placed in the drying-loft and on the following day are rolled again, and after receiving a final drying they are ready for market.

Heavy Upper-leather.—The sides after being scudded are placed on sticks and suspended in the handling liquor for 10 or 12 days and are afterwards twice "laid-away," the first "lay-away" for about 12 days and the second for 36 to 48 days. After being removed from the second lay-away the sides are exposed to the air for a day to harden and are then dampened and next "split," which latter operation consists in reducing the sides to a uniform thickness. They are next passed to a workman, called a "flatter," who levels off the shanks and bellies on a beam with a currier's knife.

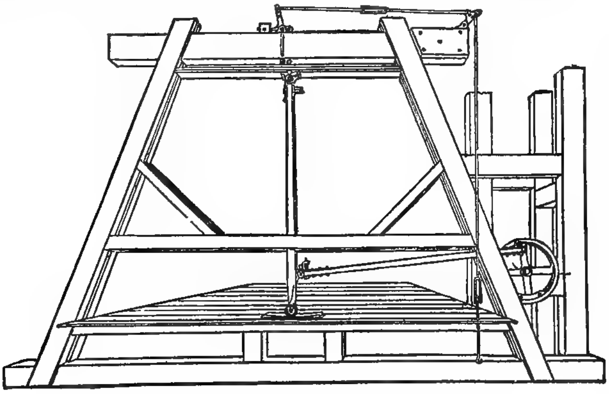
Fig. 1.

Fig. 2 shows the operation of splitting and "flatting" the sides of the leather. In order to prevent the "glazing" or "crusting" of the portion of the side from which the split has been taken off, 25 of the sides are placed in a revolving drum at one time and moderately strong gambier liquor is poured over, the drum being revolved for about 10 minutes. The sides are next replaced for about 15 days in the handlers, but are not hung on sticks, being simply pressed down in the liquor, and are handled each day from the liquor, which is strengthened after each handling.

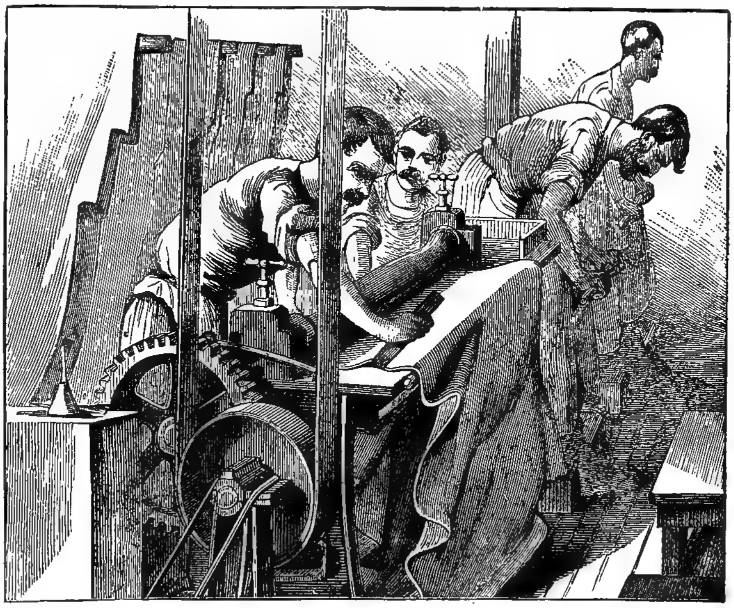
Fig. 2.

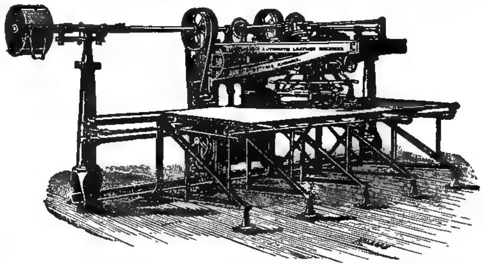
Fig. 3.

The sides of leather are next scoured, and various machines are used for this operation; the Burdon, the Fitzhenry, and the Lockwood are all well-known scouring machines.

Fig. 3 shows a perspective view of the Lockwood leather-scouring and setting-out machine.

After being scoured the sides are hung in the air to harden, and after being damped and allowed to "sammy" for two days are next "stuffed." The operation of stuffing the leather is expeditiously accomplished in about 15 minutes, by placing the sides in a revolving drum suitably heated.

Fig. 4 shows a vertical section of a stuffing drum. The interior of this drum and the leather placed therein are kept at the desired temperature by means of heated air, which is forced in while the drum containing its charge of leather is being rotated. The drum *a* measures about 7 feet in diameter and 3 feet in width, *b* is a door for the introduction of the leather, *c* is a series of pegs, *d* is a pipe through one of the journals for the admission of hot grease, *e* is a pipe through the other journal for the continuous admission of hot air while the drum is in motion. The pipe *e* is preferably placed in coil form in the combustion chamber *f*, heated in any usual way, so that air forced through the pipe by a blower, *g*, will be heated before reaching the drum. Fifty lbs. of grease are used for 200 lbs. of leather; *i. e.*, for heavy upper-leather, boot-leather requiring a greater quantity. After being stuffed the sides are next "set out" on a machine, such as shown in Fig. 2, and are next "whitened," "stoned-out," and then "boarded," or softened.

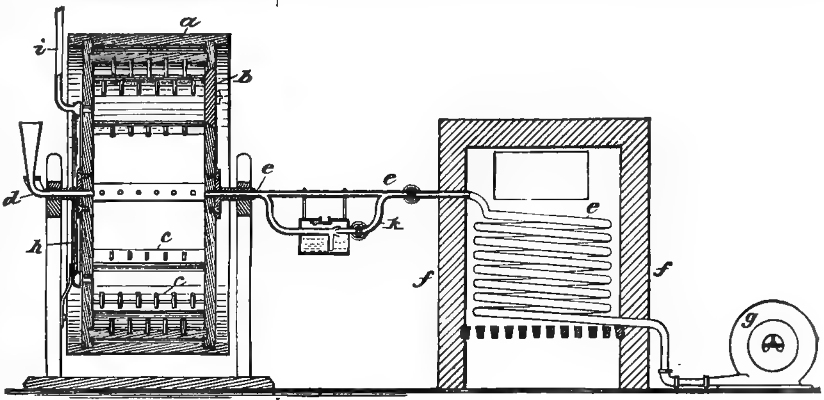

Fig. 4.

The boarding and graining of leather is accomplished by Coogan's very excellent machine. The rollers are of cork, 8 inches in diameter, and are adjusted and held in position by means of screws. The leather is fed to the machine by placing one end just over a thin steel feed-plate which is made to move toward the rollers by a slight pressure on the treadle. The rollers revolve in the same direction, the upper roller carrying the leather in and the lower one carrying it out, turning it sharply under the plate, and almost instantly boarding a side or whole hide. The sides of leather are next blacked on the flesh side with a mixture of lampblack and soap, or lampblack and oil; when "soap-blacking" is used, oil is freely applied afterwards in order to fasten the color and body of the black. The blacking is commonly applied by hand by means of a brush, and afterward rubbed into the leather by means of a dry brush. Machinery for blacking leather is in use in some of the larger leather-finishing shops of the United States; but they are thought to answer better for light than for heavy leathers. The sides are next "glassed" or polished by machinery, next tempered, and then again "glassed" and afterward "pasted." The paste is prepared by boiling 2 lbs. of brown soap and a piece of tallow about the size of a hen's egg with each pail of flour used. After being "pasted" the leather is next dried and then "glassed in the paste," and is next "sized." The size is prepared by dissolving 4 ounces of pure glue in warm water, adding ½ ounce of tallow, and then diluting with water to the desired consistency; the application of the "size" is made with a sponge, and the blackened side is finally hung up in the finishing-room to dry.

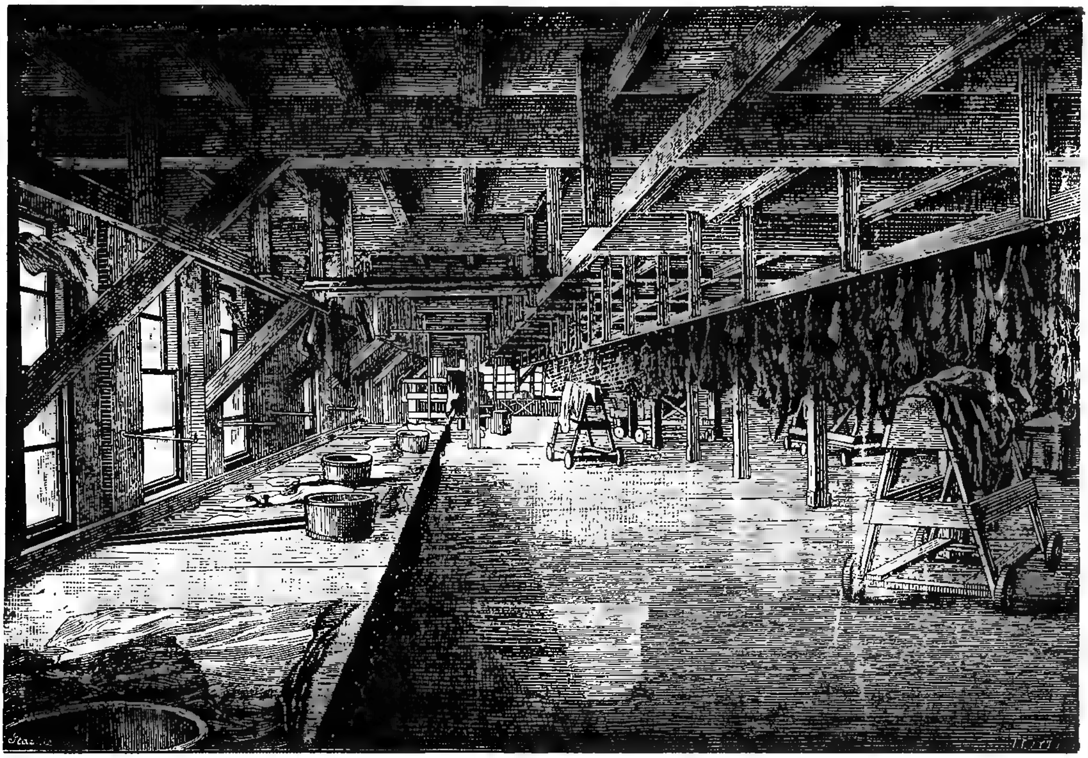

Fig. 5.

Fig. 5 is an interior view of the finishing-room of an upper-leather manufactory, showing the pasting tubs and tables, horses for receiving and moving the leather, and the blacked and pasted sides suspended from hooks in the ceiling racks. After being sized and dried the leather is assorted, and finally measured, marked, and bundled for market. Light leathers, such as upper, morocco, sheep-skin, and enamel leather, are sold by area and are usually measured by machinery.

Grain, Split, and Buffed Leathers.—After being removed from the baths the sides are allowed to remain over night in a vat of clear, cold spring water, and are tacked to sticks and suspended for about 24 days in the "handlers" containing hemlock liquor, which is increased in strength from about 6° by the barkometer at the start to 12° at the finish. On coming from the handlers the sides are dried in the open air and are next "skived" on a belt-knife splitting-machine, and after being carried to a table and "fitted" or trimmed with an ordinary shoe-knife are next "split," as has been described for heavy upper-leather. The "split" is trimmed and placed in liquor which is gradually increased during 15 days from about 8° by the barkometer to 20°. The "grain," which is the portion from which the split is taken, is reduced on a currier's beam to a uniform thickness, and after being milled with sumach liquor for about 1 hour the grains are placed in sumach liquor of about 8° strength, and here they remain for about 16 days, the strength of the liquor being gradually increased. The sides are next scoured, exposed to the air and hardened, and are afterwards stuffed, fish-oils, paraffine, oleine, and rosin being employed in the stuffing compound for the "grains," and tallow, fish-oils, and rosin for the "splits."

After being "set-out," the sides are blacked on the grain side with a preparation of logwood and copperas for the grains, and lampblack and soap for the "splits." The splits are immediately "glassed," "pasted," dried, and "reglassed," as has been described for heavy upper-leather. The "splits" are finished with gum-tragacanth dissolved to the consistency of jelly. After being assorted, measured, and rolled, the splits are ready for market.

The "grains" are finished differently from the "splits:" after being blacked, as has been described, the "grains" are hung up and dried, and are then "pebbled" on the grain side, after which they are grained on the grain side with a cork armboard, and are next polished by means of a revolving wheel, and after being again grained with the armboard are immediately oiled with a mixture of fish-oil and paraffine, and finally assorted and measured for market. In graining "pebbles" the sides are "cut" four ways; the "straight grains," however, are "cut" only from one direction.

Buffed leather is finished in the following manner: after being scoured, dried, set-out, stuffed, and dried in the loft for three days, and the superfluous grease removed from the flesh side by means of a slicker, the side is placed on an inclined table and the grain removed by means of a whitening slicker, after which the sides are blacked by first applying a decoction of logwood, and then a compound of iron rust and copperas. The sides are next "smutted," which operation is performed by working over the blackened side with a woollen rag so as to remove the dirt and sediment from the blacking compounds, and are next "glassed," then "pasted," and after being allowed to dry are next "boarded," and after being slicked off clean on the flesh side, and glassed on the grain side, they are gummed over with a preparation of gum-tragacanth made to about the consistency of jelly. After being dried the buffed leather is assorted, measured, marked, and bundled for market.

Morocco Leather.—The skins having been removed from the bran-bath and rinsed, are next sewn together at the edges of the folded skin so as to form a bag—the grain side being outward, the only opening being left at the hind shanks. The skins are tanned by filling the bags and gently forcing sumac liquor through the pores of the skins; the tanning operation usually requires about 3 hours. The tanning being completed the thread is cut and drawn, and the refuse sumac material removed from the skins, which are next washed in a revolving drum, and are then "struck out," hung in the loft to dry; and are upon being removed from the drying-loft wet in soap-water and shaved on the flesh side. The skins are next "put out," and then hung in the loft to dry. When desiccation is complete the skins are separated into two classes, one class of which is to be stained on the flesh side and the other class for pebbling. The usual commercial classification of morocco leather produced in the United States is: imitation of French kid, brush kid, glazed kid, pebbles, straight-grained goat, oiled goat. *Finishing Imitation of French Kid.*—The skins are blacked on the grain side with a black made by boiling together for five or ten minutes 4 ounces of pulverized nut-galls and 2 ounces of blue vitriol in 1 gallon of logwood liquor, and afterward adding 4 quarts of vinegar saturated with iron. The first application having been allowed to dry, a second coat of black is applied; the nut-galls and vitriol are omitted from the second black, and bi-chromate of potash, in small quantities, is sometimes used in this black. After being dried, the skins are next moistened with a solution of milk and water and are then glazed, and are afterwards softened and the blackened side oiled with the best sperm-oil. Glazing is performed two or three times, according to the brightness of the finish desired; the oil is applied twice, which completes the finishing. *Finishing Brushed Kid.*—The skins are blacked on the grain side with a preparation made by suspending 5 pounds of iron in 25 gallons of vinegar, 30 grains test, for 4 weeks, and to 1 quart of this solution adding ½ pint of bullock's blood, either warm or coagulated. The skins, after being wet over with gum-water and brushed with a soft brush, are then hung in the loft, and after being dried they are next "back-boarded," then glassed, and afterward rolled. The skins are next scraped on the flesh side with a steel slicker, and oiled on the grain side with the best sperm-oil, which completes the finishing. *Finishing Straight-grained Goat.*—The skins are first seasoned with a preparation of bullock's blood, logwood, boiled cow's milk, water, and a small quantity of vinegar black. After being dried the skins are regularly blacked with the same preparation with which they are seasoned. After hanging in the drying-loft over night the skins are glazed, then wetted in cold water, and afterward grained. After being hung in the loft and dried, the skins are again grained and afterward "back-boarded" on the flesh side. An application of the best sperm-oil to the grain side completes the finishing. *Finishing Pebble-grained Goat.*—Pebble-grained goat is finished almost similar to straight-grained goat, the difference being that the former is "cut" four ways in the process of hand-finishing, in the softening, and also in the "springing up;" but in "back-boarding," pebble-grained goat is cut only two ways. The pebbling is done on the same machine, but not with the same roller that is used for straight-graining. *Finishing Oiled Goat.*—After being blacked, the skins are stuffed on the flesh side with dubbing composed of oil and tallow, and are then hung up to dry. After desiccation the oiled goat is grained three ways, and next treated to a coat of dubbing on the grain side, which is then flattened down with a dull slicker, and treated with a coat of fine sperm-oil, which completes the finishing.

Dyeing Leather with Aniline Colors.—It is not often the case that a special mordant is required to prepare the leather for the reception of aniline coloring matters, a simple application of the color, either in aqueous or spirituous solutions, being generally sufficient. The most effective and convenient mode of mordanting leather, preparatory to the application of aniline

LEATHER TANNED IN THE UNITED STATES, 1879-1880.

States and Territories.	Establishments.	Capital.	Average number of hands employed.	Total amount paid in wages during the year.	Materials.						Products.		
					Hemlock bark. Tons.	Oak bark. Tons.	Value of sumac and other materials.	Hides.	Skins.	Total value of all materials.	Sides of leather.	Skins.	Total value of products.
Alabama	82	$86,876	136	$24,658	11	3 591	....	44,308	15,073	$127,742	88,616	15,073	$212,545
Arkansas	6	7,683	8	2,097	....	222	....	2,450	330	5,797	4,900	330	12,300
California	77	1,746,750	627	344,017	103	22,066	....	254,624	1,314,215	2,746,263	509,248	1,314,215	3,738,723
Colorado	3	16,700	14	9,000	....	....	$6,050	4,100	15,100	38,300	8,200	15,100	55,800
Connecticut	11	50,600	49	16,062	472	919	....	11,950	24,625	107,005	23,900	24,625	146,750
Delaware	3	2,800	4	650	....	130	....	1,400	195	4,700	2,800	190	7,000
District of Columbia	1	9,500	2	400	....	30	....	115	1,561	3,365	230	1,561	4,284
Georgia	94	143,441	152	32,244	14	6,034	....	74,649	21,325	197,943	149,298	21,325	323,807
Idaho	2	1,850	1	500	35	....	....	400	475	1,816	800	475	2,612
Illinois	34	2,220,114	1,241	599,028	50,762	137	4,700	395,030	1,486,570	4,160,113	790,060	1,483,570	5,402,070
Indiana	105	653,349	303	108,761	1,856	18,633	....	152,375	57,602	971,201	304,750	57,602	1,266,653
Iowa	10	14,575	15	4,327	....	108	2,375	2,470	12,025	24,099	4,940	12,025	43,974
Kansas	2	1,167	3	1,126	20	70	....	980	150	5,175	1,960	150	7,452
Kentucky	63	1,741,430	528	204,345	....	31,107	....	211,097	213,840	1,799,047	422,194	213,840	2,511,960
Louisiana	10	9,300	15	2,941	....	270	....	3,412	13,280	14,984	6,824	13,280	28,470
Maine	83	2,459,700	1,393	464,904	93,406	180	15,735	879,160	2,202,158	5,535,427	1,758,320	2,202,158	7,100,967
Maryland	63	802,343	392	127,164	75	24,733	9,191	137,667	286,250	1,039,586	275,334	286,250	1,468,591
Massachusetts	133	2,712,130	2,440	1,093,973	107,324	74	408,956	1,625,344	5,724,897	11,320,288	3,250,688	5,724,897	13,556,721
Michigan	66	1,081,489	461	222,228	21,139	1,205	1,474	184,011	341,793	1,450.559	368,022	331,793	2,029,653
Minnesota	6	32,450	26	13,910	1,724	....	460	16,716	7,046	86,853	33,432	7,046	111,000
Mississippi	34	37,690	55	12,688	22	1,650	595	21,020	9,225	66,995	42,040	9,225	106,260
Missouri	26	137,850	118	43,817	1,639	3,190	14,705	41,419	152,313	321,805	82,838	150,313	435,072
New Hampshire	53	603,450	463	199,146	34,968	....	1,600	281,490	404,341	1,732,564	562,980	404,341	2,315,616
New Jersey	55	1,810,050	1,300	716,599	11,332	14,675	60,923	369,667	1,783,647	5,262,747	739,334	1,783,647	6,748,094
New York	386	11,710,415	5,090	1,819,742	334,084	6,624	157,901	2,503,855	4,171,290	18,014,683	5,007,710	4,169,690	23,652,366
North Carolina	133	183,659	220	37,846	29	6,154	600	83,661	20,750	222,068	167,322	20,750	367,920
Ohio	302	2,022,990	927	373,595	5,775	42,274	8,050	456,015	434,732	3,247,592	912,030	432,707	4,357,273
Oregon	16	36,465	19	9,212	573	240	....	8,961	5,916	38,694	17,922	5,916	65,767
Pennsylvania	642	15,608,635	5,598	1,967,946	379,069	122,550	8,500	2,970,680	635,280	19,716,236	5,941,360	635,155	27,042,068
Rhode Island	4	368,600	113	55,694	7,375	....	....	106,777	....	509,370	213,554	....	638,000
South Carolina	28	42,675	61	9,120	....	1,605	75	20,967	4,705	47,225	41,934	4,705	73,597
Tennessee	147	470,075	345	86,988	15	15,085	....	159,524	66,909	1,041,605	319,048	66,909	1,504,660
Texas	28	31,850	39	7,411	....	825	1,260	10,920	6,016	39,030	21,840	5,791	63,750
Utah	13	43,200	26	9,768	322	81	50	5,046	4,952	27,331	10,092	4,952	47,267
Vermont	53	433,300	185	62,461	12,264	....	120	125,232	176,250	838,426	250,464	176,250	1,084,503
Virginia	163	658,973	329	80,251	69	11,662	750	125,438	30,628	706,333	250,876	30,603	1,011,830
Washington	2	14,250	4	3,075	210	....	....	2,400	900	19,260	4,800	900	27,000
West Virginia	93	515,855	301	99,338	33	16,987	3,000	150,317	50,713	1,089,620	300,634	50,713	1,451,528
Wisconsin	73	1,697,825	815	337,211	36,806	134	395	327,524	239,581	3,367,360	655,048	239,581	4,324,433
The United States	3,105	$50,222,054	23,812	$9,204,243	1,101,526	353,245	$707,465	11,773,171	19,936,658	$85,949,207	23,546,342	19,917,653	$113,348,336

colors, is to apply a ground with a fluid containing tannin, it being, of course, essential to employ a composition which will not perceptibly color the leather. The best plan, probably, consists in the application of a solution of one part of tannin (pure gallo-tannic acid) in 20 to 25 parts of water, the application of the solution being made with a soft sponge, and, after the ground has been partly dried, the first coat of color is applied. A cheaper solution of tannin, such as a weak decoction of sumac, can be used for dark colors, such as orange, orange yellow, brown, or even green.

Morocco leather, in addition to being soft and pliable, is remarkable for its glossy and otherwise attractive appearance, and is largely employed in the manufacture of the uppers of ladies' and children's fine shoes, and gentlemen's low-cut shoes, and also finds various secondary employments, such as bindings for costly books, linings for carriages, for travelling-bags, toilet-cases, pocket-books, and, in addition, it is also sometimes used for chair-covers, portfolios, etc.

Morocco leather manufacture was engendered from the gradual improvement of Cordovan leather, which latter is a soft, small-grained, colored leather, and derives its name from the Spanish city of Cordova. Morocco leather has also, in times past, been called Turkish and Spanish leather, and has been most excellently manufactured in Morocco, in the Levant, in Asiatic and European Turkey, in the Crimea, in Aleppo and Smyrna, and in the island of Cyprus; and very well. also, in Russia, Poland, Hungary, and Spain, but especially in France, England, Germany, Holland, and Switzerland.

Saffian leather is but a subname for Morocco leather; it is produced from goat-skins, and derives its name from Saffi or Asfee, as it is properly called by the natives, and anciently Saffia, which is a city of great antiquity, belonging to the province of Abda, and was built by the Carthaginians near Cape Cantin. Another leather made near Saffi, in Morocco, is the Mogador leather, which is also a subname for Morocco leather, and derives its name from Mogador, the capital of the fertile Moorish province of Haba. Large quantities of goat-skins are exported from Mogador, which are mostly brought there by caravans from Timbuctoo and the Soudan. A large amount of Morocco leather is produced at Mogador, chiefly of that rich yellow color of which slippers are so universally made.

The past fifteen years have witnessed the gradual but now complete destruction of not only Morocco but also chamois leather manufacture in Russia, although in other branches of tanning the value of productions has, for the same period, increased nearly 250 per cent. In contrast to Russia's decline in this branch of production Morocco leather manufacture has been developed to a great extent in the United States, the leading place for its production being Philadelphia, Pa., Newark, N. J., ranking next; but Wilmington, Del., and Lynn, Mass., are also producing Morocco leather in large quantities.

The finer grades of Morocco leather are manufactured from goat-skins, but other grades are obtained from sheep-skins and split calf-skins.

Statistics.—The number of tanneries in the United States, the capital invested, number of hides and skins tanned, and the total value of all products are given in the following table, which is based on the year 1880. The table includes the consumption of oak and hemlock barks, but does not include the consumption of cutch, gambier, sumach, or other tannins, either vegetable or mineral. It will be noticed that in the table Pennsylvania is credited with the greatest number of hides tanned, and Massachusetts with tanning the largest number of skins; the reason for the latter being the enormous quantities of goat-skins used in the manufacture of Morocco leather, and sheep-skins consumed for linings, bindings, and skivers. More than nine-tenths of the entire currying business is done in the twelve States mentioned in the following table; the number of establishments, the capital invested, the number of sides of leather and skins curried, and the total value of the products in each State being given, the table being based on the year 1880:

	Establishments.	Capital.	Sides of leather.	Skins.	Total value of products.
Massachusetts...	194	$4,308,169	4,951,562	5,178,609	$23,282,775
New Jersey......	56	1,983,746	818,804	1,703,316	8,727,128
Pennsylvania....	455	2,570,969	1,272,931	404,874	7,852,177
New York.........	185	1,720,356	1,048,581	639,772	6,192,002
Wisconsin.........	61	1,299,425	734,800	582,451	4,496,729
Ohio.................	251	1,089,075	632,615	256,054	3,886,627
Maine...............	34	510,900	518,850	232,552	2,612,350
Illinois.............	18	537,786	251,660	431,920	2,391,380
New Hampshire	37	351,850	435,450	339,466	2,161,734
California.........	63	427,350	266.054	466,450	2,001,850
Indiana............	93	381,552	276,760	37,181	1,461,776
Michigan	44	256,311	161,308	63,351	996,982

The following tables show the receipt of foreign and domestic hides at New York and Boston for each of the six years from 1881 to 1885 inclusive:

New York.	1881.	1882.	1883.	1884.	1885.
Foreign	2,921,869	2,309,846	1,882,036	2,188,765	2,205,521
Domestic......	482,351	605,876	584,578	543,005	539,573
Total.......	3,404,220	2,915,722	2,466,614	2,731,770	2,745,094

Boston.	1881.	1882.	1883.	1884.	1885.
Foreign	1,431,223	1,377,650	1,132,841	1,003,603	1,135,007
Domestic......	1,330,490	1,119,823	856,838	943,910	1,037,844
Total.........	2,761,713	2,497,473	1,989,679	1,947,513	2,172,951

The following table shows the value of leather and manufactures of leather imported into the United States for each of the years from June 30, 1881, to June 30, 1885:

Leather.	1881.	1882.	1883.	1884.	1885.
	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
Bend, belting, and all sole-leather	5,746,349	7,029,041	8,235,053	76,377	34,659
Calf-skins, tanned, or tanned and dressed....				2,505,670	1,934,110
Skins for Morocco............				1,637,305	1,632,829
Upper-leather of all other kinds, dressed, and skins, dressed and finished.........				3,115,764	3,130,474
Gloves, kid and leather	3,834,550	3,954,929	3,893,872	3,099,271	3,014,676
All other manufactures of....	1,005,443	1,161,791	975,490	877,677	670,127
Total.........	10,586,342	12,145,761	13,104,415	11,312,064	10,416,885

The following table gives the quantities of leather and manufactures of leather exported from the United States for each of the years from June 30, 1881, to June 30, 1885:

	1881.	1882.	1883.	1884.	1885.
Sole-leather, lbs..............	28,690,648	33,777,711	28,593,894	22,421,293	27,313,766
Boots and shoes, pairs..	300,968	389,120	442,687	502,122	492,906

The following table shows the value of leather and manufactures of leather exported from the United States for each of the years from June 30, 1881, to June 30, 1885:

	1881.	1882.	1883.	1884.	1885.
	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
Buff, grain, splits, and all finished upper-leather....	7,133,714	7,747,544	6,423,922	2,062,651	2,578,991
Patent or enameled.........				116,817	291,943
Sole................				4,613,106	5,416,830
All other leather..........				230,996	251,615
Boots and shoes	374,343	488,815	539,957	602,925	598,151
Harness and saddles.........	148,567	200,454	209,907	215,750	178,411
All other manufactures......	431,821	563,114	749,876	463,534	376,467
Total.........	8,088,445	8,999,927	7,923,662	8,305,779	9,692,408

References.—The chief works relating to the tanning and currying of leather are as follows: Davis, C. T., *Manufacture of Leather* (Phila., 1885); Dussance, F., *Tanning, Currying, and Leather Dressing* (Phila., 1865); Morfit, C., *The Arts of Tanning, Currying, and Leather Dressing* (Phila., 1852); Shultz, J. S., *Leather Manufacture: The Methods and Economies of Tanning* (New York, 1876); Vincent, C., *Fabrication et Commerce des Cuirs et Peaux* (Paris, 1872); *Leather Trades Circular and Review* (London); *Shoe and Leather Reporter* (New York); *Shoe and Leather Review* (Chicago); *Der Gerber* (Vienna); *Gerber Zeitung* (Berlin). (C. T. D.)

LEATHES, STANLEY, an English clergyman, was born at Ellesborough, Buckinghamshire, March 21, 1830, being son of the rector of the parish. He was educated at Jesus College, Cambridge, graduating B. A. in 1852. He was ordained in 1856, and held several curacies in London. In 1863 he was made professor of Hebrew in King's College, London, and in 1867 was appointed by Archbishop Tait to be Boyle lecturer. In 1873 he was Hulsean lecturer at Cambridge, in 1874 Bampton lecturer at Oxford, and in 1876 Warburtonian lecturer at Lincoln's Inn. He was one of the revisers of the English Old Testament. He has published *The Witness of the Old Testament to Christ* (1869); *Witness of St. Paul to Christ* (1870); *Witness of St. John to Christ* (1872); *Structure of the Old Testament* (1873); *The Gospel its Own Witness* (1874); *Religion of the Christ; its Development* (1874); *The Christian Creed; its Theory and Practice* (1878).

LEAVENWORTH, the largest city of Kansas, county-seat of Leavenworth county, is beautifully situated on the W. bank of the Missouri River, in 39° 19′ N. lat., 94° 58′ W. long., 25 miles N. W. of Kansas City. The extensive military establishment of Fort Leavenworth, named from Gen. Henry Leavenworth (1783–1834), adjoins the city on the N. The town is exceptionally well built, and is the point where 8 trunk lines of railway converge, a splendid iron bridge here crossing the river. Among the public buildings and institutions are a large court-house, the U. S. soldiers' home, the post-office, hospital, opera-house, and 2 orphan asylums. Leavenworth has 10 hotels, 3 national and 2 private banks, 3 weekly, 3 daily, and 2 monthly newspapers, 23 churches, an excellent system of public schools, and good private schools of various grades. It is lighted with gas, and has a fine park, an ample water-supply, a good system of sewerage, street-railways, telephone-lines, and large and varied manufactures. The main streets are macadamized. Good bituminous coal is here mined, and the town has quarries of valuable building-stone and beds of brick-clay. Among the articles manufactured are flour, syrup, glucose, stoves, machinery, bricks, castings, carriages, wagons, boots and shoes, metallic wares, iron bridges, furniture, cigars, brooms, cooperage, musical instruments, linseed-oil, and a great variety of other goods. Its total valuation is $7,000,000; public debt, $400,000. The first settlement was made here in 1854, and the town was incorporated in 1856. The population in 1880 was 16,546.

LEAVITT, JOSHUA (1794–1873), an American journalist, was born at Heath, Mass., Sept. 8, 1794. He graduated at Yale College in 1810, studied law, and was admitted to the bar in 1819. After practising at Putney, Vt., he studied theology at New Haven, and after having been engaged as a temperance lecturer was in 1825 ordained pastor at Stratford, Conn. In 1828 he was made secretary of the Seamen's Friend Society at New York. In 1831 he founded the *New York Evangelist*, to advocate the revival system in the Presbyterian Church. Prominent also in the anti-slavery agitation, he was in consequence compelled to flee for a time from New York. In 1837 he became editor of *The Emancipator*, which he removed to Boston in 1841. He was chairman of the national committee of the Liberty party from 1844 to 1847. In 1848 he became managing editor of *The Independent*, and long contributed to its pages. He died at Brooklyn, N. Y., Jan. 16, 1873.

LECKY, WILLIAM EDWARD HARTPOLE, a British historian, was born near Dublin, March 26, 1838. Graduating at Trinity College, Dublin, in 1859, he devoted himself to a literary career. His first work, *Leaders of Public Opinion in Ireland* (1861), was published anonymously. After extensive travel on the Continent he settled in London, where he published his learned and impartial *History of the Rise and Influence of the Spirit of Rationalism in Europe* (1865). After it came a *History of European Morals from Augustus to Charlemagne* (1869), and a *History of England in the Eighteenth Century* (1878). His works are all composed in a truly philosophical spirit, and combine erudition with elegance of style.

LE CONTE, JOHN, an American physicist, was born in Liberty co., Ga., Dec. 4, 1818, being son of Dr. Lewis Le Conte (1782–1838), a noted botanist. He graduated at Franklin College, Athens, Ga., in 1838, and received the degree of M. D. from the New York College of Physicians and Surgeons in 1841. He settled as a physician in Savannah; in 1846 was made professor of natural philosophy in Franklin College, and in 1856 professor in South Carolina College. In 1869 he was made professor of physics and industrial mechanics in the newly founded University of California, and in 1875 became president of that university. He has published in scientific journals and in the proceedings of learned societies important papers on physical science. A treatise on *General Physics*, nearly completed, was destroyed in the burning of Columbia, S. C., in 1865.

His brother, JOSEPH LE CONTE, was born in Liberty co., Ga., Feb. 26, 1823. He studied at a private school under A. H. Stephens, and graduated at Franklin College, Athens, Ga., in 1841. He received the degree of M. D. in New York in 1845, and settled at Macon, Ga., as a physician. In 1850 he studied natural history under Prof. L. Agassiz, at Cambridge, and in 1853 was made professor of this branch at Franklin College. In 1856 he became professor of chemistry and geology in South Carolina College, and in 1869 he accompanied his brother John to the University of California, where he was made professor of geology and natural history. Besides important scientific papers he has published essays on education and the fine arts, and *The Mutual Relations of Religion and Science* (1874).

LE CONTE, JOHN EATON (1784–1860), an American naturalist, was born near Shrewsbury, N. J., Feb. 22, 1784, being descended from a Huguenot family settled at New Rochelle, N. Y. He entered the U. S. Engineer Corps in 1813, and was employed in various surveys and fortifications. In 1831 having attained the rank of major he retired from the service. He gave much attention to botany and zoölogy, and published some monographs and memoirs. He died at Philadelphia, Nov. 21, 1860.

His son, **John Lawrence Le Conte** (1825–1883), was born at New York, May 13, 1825. He graduated at the New York College of Physicians and Surgeons in 1846, and made many scientific journeys. He gave special attention to the North American Coleoptera, and published many memoirs upon them. In 1862 he entered the army as a surgeon of volunteers, and he was afterwards made medical inspector in the regular army. In 1873 he was president of the American Association for the Advancement of Science. The Smithsonian Institution published his *Classification of the Coleoptera of North America* (1861–62) and *List of the Coleoptera of North America* (1863–66). He died at Philadelphia Nov. 15, 1883.

LEDOCHOWSKI, Miecisla Halka, a Polish prelate and cardinal, was born at Gork, Oct. 29, 1822, of an illustrious Polish family. He studied theology at Warsaw, and at the age of 18 received the ecclesiastical tonsure and habit, and pursued further studies at Vienna and Rome. Pope Pius IX. after making him domestic prelate and prothonotary apostolic, sent him on diplomatic missions to Madrid, Lisbon, Rio Janeiro, and Santiago, Chili. On being sent as nuncio to Brussels, Sept. 30, 1861, he was made archbishop of Thebes *in partibus*. In 1866, at the request of the king of Prussia, he was made archbishop of Gnesen and Posen, becoming thereby primate of Poland. On May 26, 1873, he led in the protest of the Roman Catholic clergy against the Falk laws, and when he persisted in disregard of the civil authorities was imprisoned at Ostrowa. His conduct having been approved by the pope, he was proclaimed cardinal, in a secret consistory, March 15, 1875. He was released from captivity Feb. 3, 1876, but being debarred from entrance to his diocese proceeded to Rome. He resigned his see in 1885.

LEE, Ann (1736–1784), the founder of the sect of Shakers, was born at Manchester, England, Feb. 29, 1736. Her parents were poor Quakers, and she was early married to Abraham Stanley. In 1758 she joined the Manchester Society of Friends, and in 1770 she began to preach against lustful gratification. Being imprisoned for some weeks, she claimed to have had direct revelation from Christ, and after her release gathered followers, who called her "Mother Ann." In 1774 she emigrated to New York, hoping to establish there the church of Christ's second appearing. After some vicissitudes, during which she separated from her husband, she founded a settlement at Watervliet, near Albany. During a religious revival in 1780 many persons at New Lebanon joined Ann Lee's society, and after some persecution for refusing to take oaths were left undisturbed. Ann Lee and other Shakers made a missionary journey through New England in 1781–83 and founded other societies. She died at Watervliet, N. Y., Sept. 8, 1784.

LEE, Arthur (1740–1792), an American statesman, was born at Stratford, Westmoreland co., Va., Dec. 20, 1740, being the youngest son of Thomas Lee, and brother of Richard Henry Lee (for whom see the Encyclopædia Britannica). He was educated at Eton, England, and studied medicine at the University of Edinburgh, where he received the degree of M. D. in 1765. After travel on the Continent he returned to Virginia and commenced practice at Williamsburg, then the capital. Being drawn into politics he resolved to study law, and returned to London, where he was admitted to the bar in 1770. He took part in the newspaper controversy on American affairs, using the signature "Junius Americanus." By purchasing the freedom of the city of London he was enabled to vote in the municipal elections, and he was made a fellow of the Royal Society. He assisted Dr. Franklin in his agency for the colony of Massachusetts, and in 1774 presented to the British ministry the addresses of the American Congress to the people of England and to the king. Lee also acted as a secret agent of Congress in London and Paris until September, 1776, when Dr. Franklin, Silas Deane, and Lee were formally appointed commissioners to France. In February, 1777, Lee was sent to Spain, where he exerted himself with partial success for the American cause, and afterwards he went to Prussia on a similar errand. Soon after the news of Burgoyne's surrender was received France concluded a treaty with the American commissioners, but Lee was now involved in serious disputes with Deane and Franklin. Deane was recalled by Congress and John Adams was sent in his place. Deane on his return made serious charges against Lee, and in 1779 Congress passed over Lee in nominating a minister to Spain. Thereupon resigning his appointments he sailed to America in August, 1780, to demand an investigation into his official conduct, which Congress refused, though he was permitted to make a statement of foreign affairs. Returning to Virginia he was elected to the general assembly, and thence he was sent to Congress in 1782. In 1784 he was one of the commissioners to negotiate treaties with the Indians of the North-west, and was a member of the Board of Treasury from 1784 to 1789. He died in Middlesex co., Va., Dec. 12, 1792. His *Life and Correspondence* were published by R. H. Lee (1829).

His brother, **Francis Lightfoot Lee** (1734–1797), was born at Stratford, Oct. 14, 1734, being a brother of Arthur Lee. He was taught by a private tutor, and having an independent estate became a social favorite. In 1765 he was elected to the house of burgesses, and in 1775 was sent by it to Congress. Here he signed the Declaration of Independence, and assisted in committee in framing the Articles of Confederation, and various measures, but seldom took part in debate. In 1779 he retired from public life. He died at Richmond, Va., in 1797.

LEE, Charles (1731–1782), an American general, was born at Dernhall, Cheshire, England, in 1731, being the youngest son of Col. John Lee. He is said to have held a commission in the army when only 11 years of age, and at 20 became a lieutenant in his father's regiment. With it he came to America in 1754 to take part in Braddock's ill-fated expedition, and he served in the following campaigns as captain of grenadiers. At Ticonderoga in 1758 he was wounded, and afterwards he was adopted into the tribe of the Mohawks and made a chief, with the name "Boiling Water." In 1760 he returned to England, and in 1762 he served with distinction under Burgoyne in Portugal, but a year later, his regiment being disbanded, he was placed on half-pay. His impulsive, overbearing character seems to have prevented him from obtaining further employment in the English service and in 1765 he went to Prussia, where he was well received by Frederick the Great. The king of Poland also made him an aide-de-camp and in 1769 a major-general. Lee fought in the Russian army against the Turks. After various adventures he returned to England in 1772, being now made a lieutenant-colonel on half-pay. He was a determined opponent of the policy of the British government at the time, and is said to have privately claimed the authorship of *The Letters of Junius*. In 1773 he came from England to America, where he was received by the patriots with great rejoicing on account of his political and military reputation. In June, 1775, Congress appointed him second major-general of the Continental army. He had purchased an estate in Berkeley co., Va., and he now resigned his commission in the British army, whereupon Congress resolved to indemnify him for any losses sustained. In July, 1775, he joined the army at Cambridge, Mass., and was placed in command of the left wing. In November he visited Newport, R. I., to erect works of defence, and in March, 1776, he went to Virginia to take command of the Southern department. He went on to Charleston in May, but contributed nothing to its defence against the attack of Sir

Peter Parker in June. In the autumn he joined Washington, and his division covered the retreat of the American army from Manhattan Island. When Washington passed into New Jersey, Lee was left in Westchester co., N. Y., with 7000 men. After Washington had ordered him to join the main army he moved very slowly, hoping for an opportunity to perform some romantic exploit. But on Dec. 13 he was himself surprised and captured at Baskingridge, N. J., while separated from his own forces. When his captors proposed to treat him as a deserter Congress ordered six British field-officers to be held in custody to await the result. Gen. Howe then obtained permission from the British ministry to treat Lee as a prisoner of war. Lee himself in the meantime had actually submitted to the British commander a plan for the overthrow of the American troops. The plan was not carried into effect, and remained entirely unknown to Americans until 1858, when the document in his handwriting was made the basis of G. H. Moore's paper on *The Treason of Charles Lee.* In May, 1778, Lee was exchanged for Gen. Prescott, and joined the American army at Valley Forge. He opposed the project to attack the British troops on their withdrawal from Philadelphia to New York, yet commanded the van at the battle of Monmouth, June 28. His troops, chiefly militia, were through his negligence thrown into confusion by an unexpected attack by the British rear-guard, and he ordered a retreat against the express command of Washington. For this insubordination and other unbecoming conduct he was tried by court-martial and sentenced to suspension from command for one year. In the delay before the ratification of the sentence by Congress he aggravated his offence by imprudent speeches. For his disrespect to Washington he was challenged by Col. John Laurens and was shot in the side in a duel. When Congress ratified the sentence, he retired to his estate in Virginia, where he lived in a rude frame-house, surrounded by his dogs and his books. At the end of the year, in consequence of an insulting note to the president of Congress, his commission was revoked. In 1782 he went to Philadelphia to endeavor to sell his estate and was attacked with a fever, of which he died Oct. 2, 1782. See his *Life* by Jared Sparks, in his *Library of American Biography;* and by G. H. Moore (1861).

LEE, HENRY (1756–1818), an American soldier, was born at Stratford, Westmoreland co., Va., Jan. 29, 1756, being a first cousin of Arthur and Richard Henry Lee. He graduated at Princeton College in 1774, became in 1776 captain of cavalry in Col. Theodore Bland's regiment, and in 1778 was placed in command of an independent partisan corps with the rank of major. For his capture of Paulus Hook, in July, 1779, he received a gold medal from Congress. In January, 1781, he went to the South and joined the army of Gen. Greene, in whose retreat before Lord Cornwallis Lee's legion formed the rear-guard. Lee, popularly known as "Light-Horse Harry," fought at Guilford Court-House and afterwards went with Greene to South Carolina. He assisted in the capture of Augusta, Ga., and in the battle of Eutaw Springs, and in October joined Washington at Yorktown. In 1786 he was a delegate to Congress, and in 1788 was a member of the Virginia Convention which ratified the Federal Constitution. In 1792 he was chosen governor of Virginia, and in 1794 was called by Pres. Washington to command a military force for the suppression of the Whiskey Insurrection. In 1799 he was a member of Congress, and on the announcement of the death of Washington pronounced his eulogy. The resolutions which he drafted for the occasion contained the phrase, "First in war, first in peace, and first in the hearts of his countrymen." Lee had been a Federalist, and on the election of Jefferson to the Presidency in 1801 he retired from public life. His profuse expenditure involved him in debt, for which he is said to have been imprisoned. In 1811 he removed to Alexandria, and in 1814, while in Baltimore, aided in defending the printing office and dwelling of A. C. Hanson, the Federalist publisher, from an attack by a mob. When Lee and his friends were placed in jail for safety, the mob broke open the doors and killed or injured all its inmates. For recovery of his health Lee afterwards sailed to the West Indies, but died on his return at Cumberland Island, Ga., March 25, 1818. He was the father of the great Confederate general, Robert E. Lee (for whom see ENCYCLOPÆDIA BRITANNICA).

LEE, LUTHER, an American clergyman, was born at Schoharie, N. Y., Nov. 30, 1800. Having joined the Methodist Church in 1821, he entered the Genesee Conference in 1827, and labored in Northern New York. In 1838 he became a temperance and anti-slavery lecturer, and was several times attacked by mobs. After editing some religious papers in support of his views he withdrew from the Methodist Episcopal Church on account of its position on the slavery question, and in 1843 assisted in forming the Wesleyan Methodist Connection. He was president of the first general conference of this body and editor of its organ, *The True Wesleyan*, until 1852. He then became pastor at Syracuse, N. Y., and afterwards in Ohio until 1864, when he became professor at Adrian College, Mich. In 1867 he returned to the Methodist Episcopal Church on the ground that slavery had been abolished. He has published *Universalism Refuted* (1836); *Immortality of the Soul* (1846); *Church Polity* (1850); *Slavery Examined* (1855); *Elements of Theology* (1856).

LEE, ROBERT (1804–1868), a Scotch clergyman, was born at Tweedmouth, England, Nov. 11, 1804. Graduating at the University of St. Andrew's, he was ordained in the Church of Scotland in 1832. He was minister of Arbroath, Campsie, and from 1843 of Old Grey Friars' Church, Edinburgh. In 1846 he was made regius professor of Biblical criticism in the University of Edinburgh. He advocated the use of a liturgy, and in 1857 published *Prayers for Public Worship.* For the use of these in his congregation he was tried in the church courts and was acquitted. He afterwards published *The Reform of the Church of Scotland in Worship, Government, and Doctrine* (1860), and introduced an organ in his church April 22, 1865. This innovation led to trials both in the ecclesiastical and civil courts. Dr. Lee died at Torquay, March 12, 1868. His most important work was a Reference Bible with about 60,000 references (1854). See R. H. Story's *Life and Remains of R. Lee* (1870).

LEGAL HOLIDAY. A day set apart by statute or usage on which no labor need be done, and upon which notices and service of process in legal proceedings are void. The business of the courts and public offices is suspended; presentment of commercial paper and service of legal notice, and civil process, is disallowed or excused; and in general the law, while it does not require, encourages the appropriation of the day to rest and festivity. Sunday is, strictly speaking, a legal holiday, although custom sanctions the expression, "Sundays and holidays." Webster applies *holyday* especially to a religious, *holiday* to a secular festival, but the terms have become merged in law. It was held by the U. S. Supreme Court that the proclamation of the governor of Massachusetts, appointing a certain day for "fasting, humiliation, and prayer," was only a recommendation, and had not the force of law, there being no statute in Massachusetts to sanction and enforce the proclamation, nor any immemorial usage or custom to give it binding efficacy. For a thorough discussion of the subject of holidays, see the opinion of Justice Grier in The Bark Tangier case (Richardson *vs.* Goddard), 23 *Howard's Reports*, 28.

The following are the legal holidays in the several States, those marked * having been officially so stated for this work. There are, however, in the several States, variations in the extent of exemption from legal and commercial obligations on these days.

States.	Sunday.	January 1.	Washington's Birthday.	Memorial Day.	Fourth of July.	Thanksgiving Days (National or State).	Christmas.	
*Alabama.........	“	“	“		“	“	“	
*Arkansas.........	“				“	“	“	By decisions of the Supreme Court of Arkansas Sunday only is fully a legal holiday.
*California.........	“	“	“	“	“	“	“	General election days.
*Colorado...........	“	“	“	“	“	“	“	
*Connecticut......	“	“	“	“	“	“	“	
Delaware...........	“		“		“	“	“	
Florida..............	“	“			“	“	“	Good Friday.
*Georgia............	“	“	“	“	“	“	“	
*Illinois.............	“	“	“	“	“	“	“	
*Indiana............	“	“			“	“	“	
*Iowa	“	“		“	“	“	“	
*Kansas	“	“		“	“	“	“	
*Kentucky.........	“	“	“		“	“	“	Good Friday.
*Louisiana.........	“	“	“		“	“	“	Jan. 8 (Battle of New Orleans), Mardi Gras, March 4, in New Orleans (Firemen's Day).
*Maine..............	“	“	“	“	“	“	“	Also “Fast Day”; on Governor's proclamation in April.
*Maryland........	“	“	“	...	“	“	“	Good Friday and all days of general or congressional elections.
*Massachusetts...	“		“	“	“	“	“	Also “Fast Day”
*Michigan.........	“	“	“	“	“	“	“	
*Minnesota........	“	“	“		“	“	“	Also Good Friday. Yet Feb. 22 is the only fully authorized legal holiday.
*Mississippi........	“	“			“	“	“	
*Missouri...........	“	“	“		“	“	“	Also general election days.
Nebraska...........	“	“	“	“	“	“	“	Also April 22, “Arbor Day.”
*Nevada............	“	“	“	“	“	“	“	
*New Hampshire	“		“	“	“	“	“	Also “Fast Day.”
New Jersey........	“	“	“	“	“	“	“	Also general election days.
New York..........	“	“	“	“	“	“	“	Also general election days.
*North Carolina..	“	“	“	“	“	“	“	Also May 20 (Anniversary of Declaration of Mecklenburg.
*Ohio................	“	“	“	“	“	“	“	
*Oregon.............	“	“	“	“	“	“	“	Also general election days.
*Pennsylvania ...	“	“	“	“	“	“	“	
Rhode Island.....	“		“	“	“	“	“	
*South Carolina..	“	“	“		“	“	“	Also general election days.
Tennessee..........	“	“			“	“	“	
*Texas	“	“	“		“	“	“	Also March 2 (Declaration of Texan Independence), April 21 (Anniversary of Battle of San Jacinto), general election days.
*Vermont..........	“	“	“	“	“	“	“	Also “Fast Day.”
*Virginia...........	“	“	“	“	“	“	“	
West Virginia....	“		“		“	“	“	
*Wisconsin........	“	“	“	“	“	“	“	Also general election days.

LEGAL-TENDER. The currency made suitable by law for a tender in the payment of debts. In the U. S. all gold coins of the U. S. are a legal-tender in all payments at their nominal value, when not below the standard weight and limit of tolerance provided by law. Silver coins smaller than $1 are a legal-tender in all sums not exceeding $10. The trade-dollar of 420 grains is not a legal-tender, but the silver dollar of 412½ grains is a legal-tender for all debts and dues, except otherwise expressly stipulated. Minor coins of the U. S., the 5-cent, 3-cent, and 1-cent pieces, are a legal-tender for any amount not exceeding 25 cents in any one payment. U.S. notes are a legal-tender in payment of all debts, except for duties on imports and interest on the public debt.

LEGARÉ, Hugh Swinton (1797–1843), an American statesman, was born at Charleston, S. C., Jan. 2, 1797, of Huguenot descent. While a child he was inoculated with small-pox, which settled in his lower limbs and impaired their growth. He graduated at South Carolina College in 1814, studied law, and after an extended tour in Europe returned to Charleston in 1820. He was immediately elected to the general assembly of the State, and in 1830 was made attorney-general. At the same time he became chief editor of the *Southern Review*, which he had assisted Dr. Stephen Elliott in establishing in 1827. In 1832 he was appointed *chargé d'affaires* at Brussels, and in 1836 he visited the Universities of Northern Germany. In 1837 he entered Congress, and took a prominent part in the debates on the finances of the country, but his course offended his constituents and he failed of re-election. In 1841 Pres. Tyler made him attorney-general of the United States, and when Daniel Webster withdrew from the cabinet, in May, 1843, Legaré was appointed to fill the vacancy. Having gone to Boston to take part in the Bunker Hill celebration, he died there, June 20, 1843. His biography, with selections from his writings, was published at Charleston (1846).

LEGGE, James, a Scotch sinologue, was born at Huntly, Aberdeenshire, Dec. 20, 1815. He was educated at Aberdeen, graduating at its university in 1835. He studied theology at Highbury College, London, and was sent by the London Missionary Society in 1839 to take charge of the Anglo-Chinese College at Malacca. In 1843 he removed to Hong Kong, where for thirty years he performed missionary duties. He was also minister of an English Union Church which he had gathered and organized. In 1875 a professorship of the Chinese language and literature was founded at Oxford, and Dr. Legge was appointed its first professor. He was also made a fellow and M. A. of Corpus Christi College. His book on *The Notions of the Chinese concerning God and Spirits* (1852) was intended as a help in determining the controversy about the proper term for the Supreme Being in Chinese. His most important literary undertaking is his edition of the *Chinese Classics*, giving the original text, English translation, critical and explanatory notes, and copious prolegomena. The four *Shu* were published in 1861–65; a revised translation appeared in 1879 in Max Muller's series of *The Sacred Books of the East.* Another volume of this series contains the *King* (1882).

LEGOUVÉ, Gabriel Jean Baptiste Ernest Wilfred, a French dramatist and author, was born at Paris, Feb. 15, 1807. After gaining a prize of the academy in 1827 he published some novels, of which *Edith de Falsen* (1840) was the best. His *Histoire morale des femmes* (1848), originally given as lectures, has passed through six editions. He is better known by his dramas, of which *Louisa de Lignorolles* gave Mlle. Mars one of her best parts, and *Adrienne Lecouvreur* (1849) was made famous by Rachel. His *Médée*, which had also been prepared for Rachel, was rejected by her, but when rendered into Italian was performed with success by Ristori. Among his comedies are *Les Doigts de fée* (1858); *Béatrix* (1861), dramatized from his novel of the same name; *Miss Suzanne* (1867); *Les Deux reines de France* (1865), the last of which was not acted until 1872. Several of his popular lectures were gathered under the title *Les Pères et les Enfants au XIXe siècle* (1867–69). His treatise on the art of reading aloud has been translated into English.

LEGROS, Alphonse, a French-English painter, was born at Dijon, May 8, 1837. He studied art at Lyons and Paris, amid many difficulties, and when nineteen exhibited at the Paris Salon a portrait of his father, which attracted the notice of Champfleury. Thus encouraged he produced The Angelus (1859); *Ex voto* (1861), and other works. In 1863 he went to England, where his rustic simplicity received more favor than in Paris, though afterwards his fame extended in his native country. He has been Slade professor in University College, London, and also taught in the South Kensington Museum. Among his later works are The Pilgrimage, The Spanish Cloister, The Baptism, The Coppersmith, and several portraits. His works have been made widely known by engravings and lithographs.

LEHIGH UNIVERSITY, an institution of learning at South Bethlehem, Pa., owes its existence to the munificence of Hon. Asa Packer, of Mauch Chunk.

In the year 1865 he announced his intention of founding in the Lehigh Valley an educational institution to be known by the present title. To this purpose he appropriated the sum of $500,000 and 56 acres of land on the slope of South Mountain, just outside the borough of South Bethlehem. After having contributed more than any other single man by his business enterprise, and especially by building the Lehigh Valley Railroad, to establish and secure the material prosperity of the valley in which he had settled, it was a fitting sequence that he should thus provide also for its educational and intellectual advancement. The design of the foundation was "to provide the means for imparting to young men of the valley, of the State, and of the country, a complete professional education, which should not only supply their general wants, but also fit them to take an immediate and active part in the practical and professional duties of the time." The situation, however, and the more especial needs, as well the particular capabilities of the surrounding district, practically limited this professional training to the various branches of engineering, metallurgy, and chemistry. But, besides these technical departments, what may be called liberal education was provided for by the School of General Literature. Laid out on a sufficiently modest scale, embracing chiefly the English, French, and German languages and literatures, with such other studies in history and science as are usually found in a course in arts, it was hoped that this would be a germ out of which might develop a full college course, including both ancient and modern language. This hope has been fulfilled.

Trustees were chosen by Judge Packer, and in 1866 a charter was obtained, by the terms of which the presidency of the board of trustees is vested in the bishop of the Episcopal diocese in which the university is situated. The first president of the board was, therefore, the Rt. Rev. W. B. Stevens, D.D., LL.D., Bishop of Pennsylvania; by the subsequent division of that diocese the office was transferred to the Rt. Rev. M. A. deW. Howe, D.D., LL.D., Bishop of Central Pennsylvania. This semi-official connection with the Protestant Episcopal Church was made official in 1871. Henry Coppée, LL.D., then professor of history and English literature in the University of Pensylvania, was chosen first president of the university and professor of history and English literature. The institution was fortunate in securing for its first president a man whose tastes and studies had led him into the broader paths of literature and general culture. Five other professors and one instructor were appointed. On Sept. 1, 1866, the university was formally opened. Two classes were in attendance the first year; the lower contained 39 students, and the second only one. A church building, situated at one corner of the grounds, was purchased, and, under the name of Christmas Hall, furnished ample room for the instruction of the classes. Further up the slope of the mountain work was begun on what was to be the main building, since known as Packer Hall. This was not finished until 1870, but lectures and recitations were held in it in 1869. Christmas Hall was then turned into a dining-hall and dormitories.

At first theoretical instruction in engineering was given by the professors of mathematics, chemistry, and geology, and, for the necessary practice, the temporary service of engineers, actively engaged in these professions, was secured. In 1871, it was found necessary to create a professorship of civil and mechanical engineering and one of mining and metallurgy. These professorships, supplemented by the appointment of instructors, were found sufficient until 1881, when, to meet rapidly growing needs, they were each divided, and the chairs of mechanical engineering and of mining and geology established. Additional technical instructors have since been appointed. These changes, which made possible a more complete separation of the courses, have been accompanied by a marked tendency towards specialization in the studies of the technical schools; this has raised the standard of professional attainment of the graduates, but has diminished somewhat their general training. History of the United States (including the Constitution), however, has been added to the requirements for admission, and all students take a course in English that shall familiarize them with the use of it in speaking and writing. A higher course in electricity, to supply that instruction in electrical engineering which has of late begun to be called for, was introduced in 1885, though not constituted as a separate school.

The ancient and modern languages were represented at first only by instructors. In 1876 the first step was taken towards developing the literary departments and putting them on a footing with the technical. In that year a chair of Latin and Greek was established, and in 1878 one of modern languages and one of psychology, Christian evidences, and rhetoric. In 1879 the chair of Latin and Greek was divided.

In 1874 Dr. Coppée resigned the presidency, retaining, however, his professorship. He was followed by the Rev. J. M. Leavitt, D.D., who was in turn succeeded in 1880 by Hon. R. A. Lamberton, LL.D., the present incumbent. The general course and policy of the institution have been mainly determined by the lines laid down by its first president; the business abilities of Dr. Lamberton have shown themselves in the improved administration and the rapid increase in the number of students.

The benefactions of Judge Packer did not end with his first gift. A few years after the completion of Packer Hall, he presented the university with Saucon Hall, a building adjoining Christmas Hall and intended to serve as a dormitory. In 1877 the Lucy Packer Linderman Memorial Library was erected, at a cost of $100,000, and large contributions for the purchase of books were made by Judge Packer, Dr. G. B. Linderman, and others. Since the founder's death (1878), the university has by his will received an endowment of $1,500,000. A separate fund of $400,000 was left for the maintenance of the library. With the ample means at its disposal, the library is rapidly growing from year to year. There are now on its shelves 60,000 volumes and pamphlets.

In 1866 a gift of seven acres of land, adjoining the tract given by Judge Packer, was received from Charles Brodhead, Esq., of Bethlehem, and in 1868, through the generosity of Robert H. Sayre, Esq., of South Bethlehem, the university became possessed of a well-equipped astronomical observatory. Mrs. Charles H. Cummings, only surviving child of Judge Packer, signified her intention of presenting to the University a church building to be known as the Packer Memorial Church. Work was begun upon this church in the spring of 1885. It is estimated to have a seating capacity of 1500.

A commodious gymnasium, exercise in which is obligatory upon all students, and a well-equipped laboratory for the accommodation of the departments of chemistry and of mining and of metallurgy, complete the list of College buildings, properly so called. There are besides 3 dwelling-houses, one occupied by the president and two by professors, and a boiler-house for heating purposes. The enclosed grounds, though comprising only a portion of the tract given by the founder, are large and have been tastefully laid out with walks and flower-beds by an experienced landscape gardener.

The records of the alumni show that the majority of them have acquitted themselves fairly well. Two, at least, have attained eminence: Mr. Miles Rock, of the class of 1869, chief of the commission to fix the boundary between Mexico and Guatemala, and Dr. John M. Thorne, of the class of 1870, astronomer in charge of the observatory at Cordova, in the Argentine Republic. (W. A. L.)

LEIDY, Joseph, an American anatomist and naturalist, was born at Philadelphia, Sept. 9, 1823. He received the degree of M. D. from the University of Pennsylvania in 1844, and from 1846 to 1852 gave private lectures on anatomy and physiology. In 1853 he was made professor of anatomy in the University of Pennsylvania, and in 1871 he accepted also the professorship of natural history in Swarthmore College. He has been a frequent contributor to scientific periodicals. Among his works are *Flora and Fauna within Living Animals*, *Extinct Mammalian Fauna of Dakota and Nebraska* (1870), *Extinct Vertebrate Fauna of the Western Territories* (1873).

LEIGHTON, Sir Frederick, an English painter, was born at Scarborough, Dec. 3, 1830. He studied at Rome, Berlin, Brussels, Paris, and Frankfort. As early as 1848 he had painted Cimabue Finding Giotto, and in 1855 created a sensation in London by his picture, Cimabue's Madonna Carried in Triumph. This picture was purchased by the queen. He was elected member of the Royal Academy in 1869, and was made president in 1878, when he was also knighted. He has produced excellent works on both ancient and modern themes. Among these are Orpheus and Eurydice (1864); Venus Disrobing (1867); Jonathan's Token to David (1868); After Vespers (1872); The Arts of Peace (1873); The Music Lesson (1877). At Paris in 1878 he exhibited, besides paintings, a work of sculpture, An Athlete Strangling a Python.

LEISLER, Jacob (d. 1691), an American adventurer, was born at Frankfort, Germany, and came to New York as a soldier in the Dutch service. He soon engaged in trade with the Indians and for a time lived at Albany. He went to Europe in 1678, and being captured by Moorish pirates was compelled to pay a heavy ransom. He afterwards resided in the first brick house built in New York. In 1683 he was a commissioner of the court of admiralty. When news was received of the accession of William III., Francis Nicholson, the lieutenant-governor, knew not what course to pursue and soon left the province. The members of the council were equally perplexed, and Sir Edmund Andros, who had recently been made governor-general of New England and New York, had enough to occupy him in Boston. As there was great fear of war with the French, Leisler, now a militia captain, when his turn came to guard the fort, called all the people to unite for defence of the Protestant religion. On June 22 he formally proclaimed William and Mary, and called a committee of safety. Albany at first rejected his authority, but was soon compelled to ask his aid against a threatened invasion from Canada. In consequence of mutual jealousy the aid sent was refused, and on Feb. 8, 1690, Schenectady was surprised by a band of French and Indians and its inhabitants butchered or carried captive. Leisler, who now claimed full authority as governor under a vague letter from the king, called a meeting of the New York assembly and also a colonial congress. To the latter seven delegates were sent, who assigned the quotas of militia from the provinces. Leisler added a battery of six guns to the fort at New York, sent out privateers, who brought back some prizes, and otherwise displayed laudable energy. Meantime Capt. Ingoldsby, being sent from England with a company of grenadiers, arrived some weeks before Col. Henry Sloughter, whom the king had appointed governor of New York. When Leisler refused to give up the fort except to the newly commissioned governor, Ingoldsby made an attack, in which a few soldiers were killed. Even when Sloughter arrived, Leisler was not prompt in recognizing his authority. He and his council were therefore tried for murder and treason, and eight persons were convicted and sentenced to death. Sloughter, who was a mere tool in the hands of determined men, signed the death-warrant, and on May 16, 1691, Leisler and his son-in-law, Milborne, were hanged. In 1695 the attainder pronounced on Leisler was reversed by the House of Lords, and indemnity was made to his family in 1698.

LELAND, Charles Godfrey, an American author, was born at Philadelphia, Aug. 15, 1824. He graduated at Princeton College in 1846 and spent two years in travel and study in Europe. On his return to Philadelphia he studied law and was admitted to the bar, but became a journalist and spent several years in Europe. He is a master of curious lore, yet his widest fame is due to his dialect poems in "Pennsylvania Dutch." The first of these, "Hans Breitmann's Party," thrown off hastily in 1865, proved so popular that the author was persuaded to continue work in this vein until five small volumes were issued. They are all comprised in *Hans Breitmann's Ballads* (1870). His other writings are *Poetry and Mystery of Dreams* (1855); *Meister Karl's Sketch-Book* (1855); *Sunshine in Thought* (1862); *Legends of Birds* (1864); *Egyptian Sketch-Book* (1873); *English Gypsies and their Language* (1873); *Fu Sang* (1874); *English Gypsy Poetry* (1875); *Gypsies* (1882); *Algonquin Legends* (1884). Mr. Leland has lived among the gypsies in various countries and is thoroughly familiar with their language, beliefs, and customs. In 1882 he established an industrial art school in Philadelphia, but in 1885 returned to London.

LEMMING, a genus of small rodents, belonging to the sub-family *Arvicolinæ*, or field-mice. The genus *Myodes*, or lemmings, differs from the typical Arvicolas by having hairy soles, a very short tail, long, curved claws, small or absent external ears, and in some minor characters. They are the most northerly of rodents, being mainly confined to the Arctic circle. The best known species is the Norway lemming, whose occasional remarkable migrations can only be compared in character with the somewhat similar movements of the migratory locust. In North America there are several species, non-migratory in habit, described by some writers as the genus *Georychus*. Their native locality is the mossy and swampy regions of the Arctic circle. The best known of these, the Hudson Bay lemming (*M. torquatus*), extends as far south as Labrador in the Atlantic, and further south in the Pacific region. It is about 5¼ inches long, with a tail ½ inch long. The color is reddish-brown in summer and white in winter. It is destitute of external ears. In summer it burrows in the ground, usually beneath stones or in dry ridges. In winter it inhabits a nest of moss, from which it seldom ventures out. It lives on roots and like food, is inoffensive, easily tamed, and very fond of caresses. There are three other species described in the same region, all of which resemble the above in character and general habits. See Arvicolinæ.

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LE MOYNE, a Canadian family, noted for the services of several of its members in French explorations and colonization.

1. Charles Le Moyne (1626–1683), its founder, born in Normandy, came to Canada in 1641, lived among the Hurons, and fought with the Iroquois. In 1668 Louis XIV. made him Seigneur de Longueil, and afterwards also de Châteauguay. He was for some years captain of Montreal. Of his eleven sons Bienville and D'Iberville (which see) were the most noted. Of the others the following deserve mention:

2. Charles, Baron de Longueil (1656–1729), the eldest son, in his youth served in the French army in Flanders and afterwards in Canada. He was made governor of Montreal and baron in 1700, and became commandant-general of the colony. He was governor

of Three Rivers in 1720, and again of Montreal in 1724. Here he died, June 8, 1729.

3. **Jacques, Sieur de Ste. Hélène** (1659–1690), served with his brother Pierre (afterwards Iberville) in 1686 in Troyes' expedition against the English on Hudson Bay, which resulted in the capture of three forts and a war-vessel. He was second in command of the expedition which captured Schenectady on Feb. 9, 1690, and he was mortally wounded in the defence of Quebec against Sir William Phips in the same year.

4. **Paul, Sieur de Maricourt** (1663–1704), took part in expeditions to Hudson Bay and served under his brother Iberville in the defence of Quebec. He was engaged in Frontenac's expedition against the Iroquois, and negotiated peace with them in 1701, but in April, 1704, was killed by them.

5. **Joseph, Sieur de Seriguy** (1668–1734), became an officer in the French navy, and in 1694 and 1697 brought vessels to Hudson Bay to co-operate with land forces under his brother Iberville. He afterwards conveyed some of the first colonists to Louisiana, surveyed its coast, and assisted in capturing Pensacola. He became captain of a ship-of-the-line in 1720, and in 1823 was made rear-admiral and governor of Rochefort, France, where he died in 1734.

6. **Antoine, Sieur de Chateauguay** (1683–1747), entered the French army and brought a band of colonists to Louisiana in 1704. He was made commandant of troops there in 1717 and king's lieutenant in 1718. Having assisted in capturing Pensacola from the Spaniards in May, 1719, he surrendered it to them in August, and was prisoner of war until July, 1720. He then held command at Mobile until 1726, when he was recalled to France. He was made governor of Martinique in 1727, and afterwards of Cayenne, returning to France in 1744. He was made governor of Cape Breton in 1745, and defended Louisburg against the New England forces under Sir William Pepperell. He died at Rochefort, France, March 21, 1747.

L'ENFANT, Pierre Charles (1755–1825), an American engineer, was born in France in 1755. He came to America with Lafayette in 1777, and served as an officer of engineers. In 1778 he was made captain, and was wounded at the siege of Savannah. He afterwards served under the immediate command of Washington, and he was made major in May, 1783. He was engineer at Fort Mifflin on the Delaware in 1794. He was the author of the plan of the city of Washington and the architect of some of its buildings. In 1812 he was appointed professor of engineering at West Point, but declined. He died in Prince George's co., Md., June 14, 1825.

LENORMANT, Charles (1802–59), a French archæologist, was born at Paris, June 1, 1802. He studied law, but became interested in classical antiquities, and in 1825 was made an inspector of the fine arts. In 1828 he went to Egypt for scientific explorations, and afterwards to Greece. In 1830 he was made chief of the section of the fine arts in the ministry of the interior, and in 1835 professor at the Sorbonne. In 1848 he was made professor of Egyptology in the Collège de France. He died at Athens, Nov. 24, 1859. His treatises relate to art, numismatics, Egyptology, and Oriental history.

LENORMANT, François, a French archæologist, son of the preceding, was born at Paris, Jan. 17, 1837. Following the example of his father he became an Oriental archæologist, but he also discussed in newspapers and pamphlets the Eastern questions of the present day. After being for ten years a librarian of the French Institute he was made in 1874 professor of archæology in the National Library. He gave especial attention to Assyrian researches, and his works in this department are of the highest authority. His *Manual of the Ancient History of the East* (3 vols., 1868–69; Am. ed., 1869–70) gives a full account of the results of modern research. His other works include *Les Chefs-d'œuvre de l'Art antique* (3 vols., 1867–69); *Histoire du Peuple juif* (1868); *Histoire des Peuples Orientaux* (1869); *Les Sciences occultes en Asie* (2 vols., 1874–75). He made many important discoveries in the cuneiform inscriptions and in the Accadian languages. He died Dec. 9, 1883.

LEO XIII., Pope, was born at Carpineto, Italy, March 2, 1810. He is the son of Count Ludovico Pecci, and was baptized by the name Vincenzo Gioacchino. In his youth he was known by the former, but later he commonly used Gioacchino. He was educated at the Jesuit College at Viterbo, and after 1824 at Rome. He was devoted to study, became eminent in philosophy, and was made a doctor in laws. In 1837 Pope Gregory XVI. made him a domestic prelate and referendary of the Segnatura, and in the same year he was ordained priest. He served as apostolic delegate at Benevento, Perugia, and Spoleto, ruling each district with firmness and energy. In 1843 he was made archbishop of Damietta *in partibus*, and sent as nuncio to Belgium, where he remained three years. On Jan. 19, 1846, he was nominated bishop of Perugia, and in December, 1853, he was created a cardinal by Pope Pius IX. He was a member of several of the congregations of cardinals, and in September, 1877, he was made Cardinal Camerlengo. As such he acted as head of the church in temporal matters on the death of Pope Pius, Feb. 7, 1878. Sixty-two cardinals attended the conclave which was closed in the Vatican on Feb. 18, 1878. On the first ballot Pecci had 19 votes, on the second 34, and on the third 44. He was then made pope by adoration, and assumed the name Leo. He was crowned March 3 in the Sistine chapel. Distinguished as a scholar, well acquainted with the movements of modern thought, moderate yet firm in his rule, it was felt throughout Europe that his character and attainments fitted him for the peculiar circumstances in which the papacy was then placed. In December, 1878, he issued his first encyclical, in which he summoned all the intellectual forces of Catholicism in opposition to the anarchical doctrines of modern socialism. He took advantage of every opportunity to conciliate the governments of Europe, without abating the assertion of the rights of the church and the papacy. He urged the extension and improvement of popular education, recommended the study of St. Thomas Aquinas to Catholic universities. He gave warning against the increase of divorce and the wrong ideas of marriage in modern society. He established greater economy in the administration of temporal affairs, and gave a spiritual impulse which has been felt to the utmost limits of Christendom.

LEPSIUS, Karl Richard (1810–1884), a German Egyptologist, was born at Naumburg, Dec. 23, 1810. He was the son of K. P. Lepsius (1775–1853), a distinguished archæologist, and studied at the Universities of Leipsic, Göttingen, and Berlin. At the latter he enjoyed the instructions of Bopp, and gained his degree in 1833 with an essay on the Eugubine tables. He then went to Paris, and with his *Paläographie als Mittel der Sprachforschung* (1834) gained the Volney prize. A year later he went to Rome and, through the influence of Bunsen, devoted himself to Egyptian research. He visited England in 1838, and projected an expedition for scientific and historical research in Egypt, which was carried out through the patronage of Frederick William IV. of Prussia. Under the leadership of Lepsius it reached Alexandria in 1842, made most important discoveries in both Upper and Lower Egypt, and in 1845 brought to Berlin a valuable archæological collection. Lepsius now entered upon the duties of his professorship at Berlin, and published his interesting *Briefe aus Aegypten* (1852). In 1866 he made a second visit, in which he explored the delta of the Nile. In 1874 he was made chief of the Prussian State Library at Berlin. He died July, 1884. He gave much attention to the history of the alphabet, and also published, in German and English, a *Universal Standard Alphabet* (1863). The cuneiform inscriptions also attracted his notice, and were the subject of several of his later works. Among his most important publications were *Chronologie der Aegypter* (1849); *Die Denkmäler aus Aegypten und Aethiopen* (1849–59).

LESLEY, John Peter, an American geologist, was born at Philadelphia, Sept. 17, 1819. After graduating at the University of Pennsylvania in 1838 he took part in the Pennsylvania Geological Survey, 1839–41; then studied theology at Princeton, N. J.; and in 1844, after being licensed to preach by the Philadelphia Presbytery, went to Europe and studied theology at Halle. He was a missionary to the Germans in Pennsylvania for two years, and in 1847 became pastor of a Congregationalist church at Milton, Mass. Here his theological views underwent a change, in consequence of which he left the pulpit and devoted himself to geology, in which he had labored at intervals previously. He was for some years secretary of the American Iron Association, and also secretary and librarian of the American Philosophical Society. In 1872 he was appointed professor of geology in the University of Pennsylvania, and in 1874 chief geologist of Pennsylvania, with charge of a complete survey of the State. Besides maps and reports he has published a *Manual of Coal and its Topography* (1856); *The Iron Manufacturer's Guide* (1859); *Man's Origin and Destiny* (1868).

LESSEPS, Ferdinand de, Vicomte, a French engineer, was born at Versailles, Nov. 19, 1805. He was connected with the French consulate at Lisbon in 1825, and after holding various consular positions in Tunis, Algeria, and Egypt, he was made consul at Barcelona in 1842, when he especially distinguished himself during the bombardment of the city. In 1848 he was sent as minister to Spain, but in 1849, being sent to Rome, he was not disposed to carry out his instructions, and retired from the service. In 1854 he went to Egypt, on the invitation of the viceroy, Mohammed Said, and then first disclosed the idea of the canal with which his name is inseparably connected. The enterprise received official sanction, though eminent engineers questioned its practicability, and diplomatic difficulties threatened to prevent its accomplishment. In 1859 the company organized for the purpose, having secured subscriptions of $400,000, began the work. The most serious obstacle was the withdrawing of the Egyptian fellahin in 1863 to cultivate the cotton, which the civil war in America had brought into demand. The first canal, however, was opened for boats Aug. 15, 1865. Then new dredging- and digging-machines were employed, and the waters of the Mediterranean and of the Red Sea were mingled in the Bitter Lakes, Aug. 15, 1869. Preparations were then made for the inauguration of the canal with ceremonies appropriate to its importance in the world's history. On Nov. 17, 1869, the celebration took place at Port Said, in the presence of representatives of the principal nations of Europe, including the Empress Eugenie and the Emperor of Austria. Five days later Count de Lesseps was married for the second time, the bride being Mlle. Autard de Bragard. Abundant honors were showered upon the veteran diplomatist, who had accomplished the feat pronounced impossible by some of the greatest engineers of the time. He continued to preside over the actual operations of the canal, and, besides a shoal of pamphlets, plans, and reports, has published *Lettres, journals et documents pour servir à l'histoire du canal de Suez* (1875). He also gave his active support to other schemes of titanic engineering, among which were the conversion of part of the Sahara into a sea by an inlet from the Mediterranean. In 1879 he zealously undertook to do for the New World what he had accomplished for the Old, though it was tenfold more difficult to carry a canal through the Rocky Mountains than through the sands of Egypt. In spite of the disfavor with which his project was received in the United States, even after his visit to that country, he pushed on, visited the ground, drew up his plans, organized companies, and negotiated with the capitalists. (See Interoceanic Canals.)

Of his two brothers, Theodore (1802–1874) pursued to the end the diplomatic career to which Ferdinand gave many years of his life; while the younger, Jules, has been active in the great works already mentioned. Count de Lesseps' son, M. Victor de Lesseps, has explored in China and India the route for a railway projected by his indefatigable father.

LESSING, Karl Friedrich, a German painter, was born at Wartenberg, Silesia, Feb. 15, 1808, being a grand-nephew of the famous G. E. Lessing. He was sent to the architectural school at Berlin, but turned to painting, his first work, A Churchyard in Ruins, being produced in 1825. He then studied under Schadow, and in 1829 executed The Battle of Iconium. He afterwards found subjects in the history of Bohemia, the first being A Hussite Sermon (1837), followed by Huss before the Council of Constance (1842), and The Martyrdom of Huss (1850). His choice of subjects excited much controversy in Germany, but the artist persisted until he freed the school of Düsseldorf from its former restriction to the Roman Catholic style and range. Although frequently considered to be greater as painter of landscape than of history, he has worked conscientiously in both departments. Among his landscapes The Oaks of a Thousand Years and the Cloister in the Snow are the most famous.

LEUTZE, Emanuel (1816–1868), an American painter, was born at Gmünd, Würtemberg, May 24, 1816. While he was an infant his parents removed to Philadelphia, where he spent his youth. Having shown talent for drawing, he painted an Indian Gazing at the Setting Sun, and the success of this painting enabled him in 1841 to go to Düsseldorf, where he studied under K. F. Lessig. His first work there was Columbus Before the Council of Salamanca, then Columbus in Chains, and Columbus Before the Queen. After a visit to Italy he returned to Düsseldorf, where he resided until 1859. Returning to the United States, he produced many historical paintings, among which are Washington Crossing the Delaware, Washington at Monmouth, Storming of Teocalli, Settlement of Maryland by Lord Baltimore, and some portraits. One of his latest works was Western Emigration, painted for the staircase of the capitol at Washington. He died at Washington, July 18, 1868.

LEVEE. See Mississippi River.

LEVI, Leone, a British economist, was born at Ancona, Italy, June 6, 1821. He was trained for mercantile pursuits, and in 1844 settled at Liverpool, England, where he became naturalized. He soon urged upon the mercantile community the necessity of a Chamber of Commerce, which was established in 1849, with Mr. Levi as secretary. Gathering information from similar societies in other countries he published *Commercial Law of the World* (1850), which in the second edition was called *International Commercial Law* (1873). He was made professor of the practice and principles of commerce in King's College, London, in 1852, and was admitted to the bar in 1859. He has done much to improve British commercial law. Besides many contributions to leading periodicals he has published *On Taxation: How it is Raised and How it is Expended* (1860); *History of British Commerce, 1863–70* (1872).

LEVITES. According to the Biblical narrative Levi was the third son of Jacob by Leah (Gen. xxix. 34), and one of the twelve patriarchs. Jealous of his sister's honor, who was ravished by Shechem, the son of Hamor (Gen. xxxiv. 2), in company with his brother Simeon, he cruelly slew the men of

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Shechem while they were disabled from self-defence through the effects of the rite of circumcision (Gen. xxxiv. 25). [The pains occasioned by circumcision in the case of adults, which are said to confine them to bed for several days, may account for the easy victory of Simeon and Levi over a town which was probably small, without our supposing that we have to do with two tribes having a communal existence, cf. Rosenmüller, *Das alte und neue Morgenland* (Leipzig), vol. 1, p. 169.] The Shechemites had submitted to circumcision that they might become one people with the sons of Israel (Gen. xxxiv. 21–24). While it was a providential deliverance of the progenitors of the people of revelation and redemption from admixture with the heathen at the very beginning of their history, their father reproaches them immediately after the act (Gen. xxxiv. 30), and many years later, on his deathbed, with prophetic vision predicts that they shall be scattered in Israel (Gen. xlix. 7). This prediction was fulfilled, but the curse was turned in Levi's case into a blessing, through the zeal of his descendants in seeking to stamp out idolatry after the worship of the golden calf (Ex. xxxii. 26–28). Levi in his descendants received the priestly blessing of the first-born son (Num. iii. 45), although the royal prerogative was reserved for his younger brother Judah (Gen. xlix. 10; cf. Judges i. 1, 2).

The critics of the modern critical school maintain that the laws and history of Israel have received a twofold treatment, a prophetic and a priestly. The prophetic, comprising certain parts of the Hexateuch (Pentateuch and Joshua), extends from Judges to Kings inclusive; the priestly, which embraces the remainder of the Hexateuch, includes Chronicles and Ezra (Nehemiah), which were written much later than Kings. It is affirmed by these critics that the Old Testament Scriptures contain two entirely unreconcilable representations of the tribe of Levi. According to the prophetic writings, which are said to be earlier than the priestly, any Levite may become a priest. According to Ezekiel, a prophetic-priestly writer (see Ezek. i. 3), all the Levites who had served as priests of the high places (*Bamoth*) are degraded from the priesthood (Ezek. xliv. 10–14), and hereafter only the sons of Zadok, whose ancestry is traced back by a priestly writer to Aaron through Eleazar (1 Chron. vi. 35–38), are permitted to serve in this capacity. This theory, which involves the publication of the Priests' Code after the exile, and consequently the denial of the Mosaic authorship of the Pentateuch, or of any part of it, is very plausible, and is held by many Old Testament scholars at the present time.

If we turn to the priestly representation of the tribe of Levi we find that the term Levite is used in two senses: one general, with reference to any member of the tribe, including the priests; the other, special with reference to the office of the Levites as assistants and servants of the priests.

1. The author of the Epistle to the Hebrews, who was thoroughly versed in the Priests' Code, speaks of a Levitical priesthood (Heb. vii. 11). In this usage there can be no misunderstanding. Both the writer and the original readers of the epistle knew that the sons of Aaron were meant. Nor was this mode of expression used through carelessness, but by design, because the author's argument turns on an allusion to the progenitor Levi (ver. 9).

2. Priestly writers speak of the sons of Aaron and of the Levites in the narrow sense, under their general tribal designation as Levites (Ex. vi. 16–25; Num. xvii. 23, Eng. ver. xvii. 8). They are indiscriminately addressed as Levites (2 Chron. xxix. 4–5), although their duties are sharply distinguished in the mind of the speaker (cf. ibid. ver. 16). The forty-eight Levitical cities, of which the priests receive thirteen, are mentioned as belonging to the Levites in a passage which gives no hint of their division between the priests and the Levites (Lev. xxv. 32–34) simply because the law in regard to the sale and redemption of property appertains alike to all members of the tribe of Levi, whether Levitical priests or common Levites. It is affirmed that the term Levite is not used in both senses in the prophetic writings. Indeed it is claimed that it is used in only one; that is, as a designation of the tribe, and that it is clearly taught that any Levite may become a priest (Deut. x. 8; xviii. 6).

The following points, however, should be remembered in the discussion of this question:

1. The number of passages in which the Levites are mentioned in the prophetic writings is small in comparison with those found in the priestly.

2. In Deuteronomy, where they are mentioned most often, their duties are never described in detail for the sake of giving information to the priesthood, but under the most general classification. In the Priests' Code this is entirely different. The respective duties of the priests and Levites are set forth with great circumstantiality, as might be expected in a work written expressly for them. In Chronicles, however, the duties of the tribe, including priests and Levites, are sometimes summarized much as in Deuteronomy (with Deut. x. 8, 9, cf. 2 Chron. xxix. 4, 11, 12). But it cannot be said that there is no distinction between the priests and Levites in Deuteronomy. Especial prominence is given to Aaron and Eleazar his son in one passage. It is briefly stated that Aaron died and Eleazar became priest in his stead (Deut. x. 6. According to Kayser this passage is Jehovistic). What can be indicated here but the high-priesthood? The Levite priests by any fair interpretation are to be distinguished from the rest of the tribe even in Deut. xviii. 1 (see *The Levitical Priests* (Edin., 1877), pp. 25 ff.), and certainly are so distinguished in Deut. xxvii. 9, 14, 12. The Levite who is to be invited on the feast days to join with the Israelites in their celebrations (Deut. xii. 12, 18, 19, etc.) is not a priest in *esse*, and cannot be proved to be a priest in *posse* of the legitimate worship.

3. In the Deuteronomic passages of Joshua the Levite priests reappear (Josh. iii. 3, viii. 33); not to speak of the priestly portions of the book, but in a passage which is reckoned by Kayser and Wellhausen as Jehovistic we have an allusion to Eleazar (Josh. xxiv. 33) which is quite in keeping with Deut. x. 6.

4. In Judges there are only two references to Levites. Neither of them can be quoted to prove that Levites, merely by virtue of belonging to the tribe, might claim the priesthood. The first instance is introduced by the well-known formula: "In those days there was no king in Israel, but every man did that which was right in his own eyes." This was not only sufficient reason for Micah's idolatry (Judges xvii. 5) but also for his securing the services of a poor Levite as a priest (ver. 10). Although Micah expresses great satisfaction in this (Judg. xvii. 13), yet the account cannot be proved to show that any Levite simply by virtue of his belonging to the tribe was then recognized as a priest. It is rather evident that the young man was a mere Levite. Nor is there the slightest evidence that the Levite who was going to the house of the Lord (Judges xix. 18) was anything more than an ordinary Levite. There is, however, an indication of the legitimate Aaronic priesthood in the mention of Phineas (Judg. xx. 28. Wellhausen, *Prolegomena to the History of Israel* (Edin., 1885), p. 237), pronounces this passage a gloss). If now these passages do not prove the existence of priests and Levites they are not counter to them.

5. In the remaining historical books (Samuel—Kings) there are only three references to the Levites. The first of these (1 Sam. vi. 15) may be understood as referring simply to the Levites. The passage does not indicate whether they were Levite priests or not. In the second passage (2 Sam. xv. 24) there seems to be a distinction made between the priests Zadok and Abiathar who are said to carry the ark of

the covenant of the Lord, accompanied by their sons (vs. 27–29) and the ordinary Levites. The only passage in Kings where the Levites are mentioned is in connection with the priests (1 Kings viii. 4), as "priests and Levites," thus plainly indicating two different classes in the hierarchy. This passage is thrown out of the discussion by the critics of Wellhausen's school, because it occurs without a connective in the *Textus receptus* of 2 Chron. v. 5 as "the priests the Levites," and because it is omitted from the Septuagint version of Kings (W. Robertson Smith). This is a case, however, where the omission of the word Levites by the Septuagint has nothing to do with the question, because the text of Chronicles antedates the Septuagint translation, and this text clearly had the word Levites. The question then arises as to what was the original text. It is indeed a strange proceeding on the part of the critics to correct the text in the book of Kings (1 Kings viii. 4) by that of the despised book of Chronicles (2 Chron. v. 5). Besides, according to their very canons of criticism, as the Septuagint, Jerome, and the Targum agree with over thirty excellent Hebrew manuscripts in inserting a connective in 2 Chron. v. 5, the question might well be raised whether we have the original reading as given in the *Textus receptus* of the passage which they employ as a connective of 1 Kings viii. 4; cf. *The Levitical Priests* (Edin., 1877), pp. 221–225.

6. The Levites who are represented by Ezekiel as not going astray were the sons of Zadok (Ezek. xliv. 15), whose genealogy is traced back in the priestly writings to Aaron through Eleazar (1 Chron. v. 27–34). It is not improbable that those who had been priests of the high places were descendants of Ithamar (*Levitical Priests*, p. 76), and hence were Aaronitic priests as well as the sons of Zadok.

7. While Jeremiah in a pre-exilic prophecy represents that God's covenant is with the Levites the priests (Jer. xxxiii. 21) he does not occupy any different ground from Malachi, who was probably a contemporary of Nehemiah, and who therefore prophesied after the promulgation of the Priests' Code in the year 444 B. C., when, according to the critics, the distinction between the priests and the Levites was well established. Indeed, Malachi's position is the same as that of the author of 1 Sam. ii. 28, where God is represented as choosing Levi from the tribes of Israel to be his priest. This representation, however, is quite consistent with that in Numbers (xvii. 3, 8), where Aaron's name is written upon the rod of Levi, and where Aaron stands for his tribe.

It seems, therefore, that while we cannot prove that the prophetic books make any such clear distinction between the priests and Levites as belonging to two different hierarchical orders as the priestly books do, since there was no occasion for them to do so, yet we may hold not only that they contain nothing contradictory to the idea that there were Levites as well as priests, but also that some passages can be best explained in accordance with this supposition. (S. I. C.)

LEWIS, Dio, an American physician, was born at Auburn, N. Y., March 3, 1823. He studied at the Harvard Medical School, and commenced practice at Port Byron, N. Y. Afterwards removing to Buffalo, he published a health magazine, in which he advocated the light gymnastics. Becoming widely known by his contributions on this subject to the *Atlantic Monthly* and other periodicals, he established at Boston an institution for training teachers in his system. In 1864 he opened a school for young ladies at Lexington, Mass., which was destroyed by fire in 1868. He then engaged in medical practice in Boston. He has published *New Gymnastics* (1862); *Weak Lungs* (1863); *Our Girls* (1871); *Chats with Young Women* (1874).

LEWIS, Edmonia, an American sculptor, was born near Albany, N. Y., in 1845, of mixed African and Indian blood. Her talents as a sculptor first became known by her exhibition in 1865 of a bust of Col. R. G. Shaw, who commanded the first U. S. colored regiment. In 1867 she went to Rome. Her works include The Death of Cleopatra (Centennial Exhibition, 1876); The Old Arrow-maker and His Daughters; The Marriage of Hiawatha.

LEWIS, Morgan (1754–1844), an American general, was born at New York, Oct. 16, 1754. His father, Francis Lewis (1713–1803), was a signer of the Declaration of Independence. The son graduated at Princeton College in 1773, and began the study of law, but was soon drawn into military service. He fought at Saratoga, and at the close of the war was a colonel Having returned to the law, he was made attorney general of New York in 1791, and a judge of the supreme court in 1792. In 1804 he was elected governor, but in 1807 he returned to his profession. In 1812 he was made quartermaster-general of the U. S. army, and in 1813 major-general. He served at Niagara, and afterwards took charge of the defence of New York city. He afterwards devoted himself to agriculture. In 1835 he was made president of the New York Historical Society. He died at New York, April 7, 1844.

LEWIS, Tayler (1802–1877), an American author, was born at Northumberland, N. Y., March 27, 1802. He graduated at Union College, Schenectady, in 1820, studied law, and began practice at Fort Miller in 1824, but afterwards took charge of the academy at Waterford. In 1838 he was made professor of Greek and Latin in the University of the City of New York, and in 1849 was called to the chair of Greek in Union College, where he also gave instruction in Oriental languages. He died at Schenectady, N. Y., May 11, 1877. He was noted for his profound scholarship, his reverence for the Bible, and his fertility in writing. He was for many years one of the editors of *Harper's Magazine*, and was a constant contributor to religious periodicals and learned reviews. Among his works are *Plato Against the Atheists* (1844); *Six Days of Creation* (1855; last ed., 1879); *The Bible and Science* (1856); *The Divine Human in the Scriptures* (1860); *State Rights* (1862); *The Light by which we see Light* (1875); and various additions to Lange's *Commentary* in the American edition.

LEWISTON, a city of Maine, in Androscoggin county, is pleasantly situated on the E. bank of Androscoggin River, opposite the city of Auburn, and 35 miles N. of Portland. It is on branches of the Maine Central and Grand Trunk Railways. The river is crossed by several bridges, and having a natural fall of nearly 50 feet affords an excellent water-power. A strong dam of stone and a canal render this power available. The city has numerous churches, excellent graded schools, a public library, 2 national and 3 savings banks, a daily and 2 weekly newspapers, and is the seat of Bates' College, a Free-will Baptist institution. A great amount of capital is invested in the mills of Lewiston, the largest of which are the property of incorporated companies. Among the goods turned out are beaver-cloths, meltons, cassimeres, and other woollen-goods, cotton-fabrics in great variety, machinery, boots, shoes, jute-goods, brushes, etc. It was founded in 1770, incorporated in 1795, and chartered as a city in 1861 Population in 1870, 13,600; in 1880, 19,083

LEXINGTON, a city of Kentucky, county-seat of Fayette county, stands in the beautiful and fertile blue-grass region, 77 miles S. of Cincinnati. It is on the Cincinnati Southern, Kentucky Central, Chesapeake and Ohio, and Louisville and Nashville Railroads. It has 4 hotels, 6 national and 2 other banks, 17 churches, a public library, a court-house, and 6 schools, and is the seat of the Kentucky University and of the Eastern Kentucky Lunatic Asylum. The city has saw- and flouring-mills, a hemp-factory, distilleries, copper-works, and manufactures of spokes, wheels, and tobacco, the latter being a great staple of trade. Five weekly and 4 daily papers are published here. The fine Henry Clay monument is one of the ornaments of the city. The streets are wide and well paved, and the city has a neat and attractive appearance. It has gas, water-works, and a public park, and is the mart of trade for a large extent of fertile and well-developed country. The total valuation is $9,000,000; the public debt, $137,000. The town was first settled in 1776. Population in 1870, 14,801; in 1880, 16,650, of whom nearly one-half were colored.

See Vol. XIV. p. 504 Am. ed. (p. 505 Edin. ed.).

LIBEL. The United States received the law of libel from England with other parts of the common law without material change. Probably, however, if it were attempted to enforce the old liability for libels upon the government, it would be held that that part of the common law which made libels of the government indictable was inconsistent with American institutions and therefore never in force in the States. Early in the history of the government (in 1798) a statute was enacted by Congress which is commonly known as the Sedition law, one section of which made a criminal offence the printing or publishing "any false, scandalous, and malicious writings against the government of the United States, or either House of the Congress, or the President, with intent to defame them, or to bring them into contempt or disrepute, or to excite against them the hatred of the good people of the United States, or to stir up sedition, or with intent to excite any unlawful combination for opposing or resisting any law of the United States or any lawful act of the President, or to excite generally to oppose or resist any such law or act, or to aid, abet, or encourage any hostile designs of any foreign nation against the United States." The maximum punishment was a fine of $2000 and imprisonment not exceeding two years; but the accused was permitted to rely upon the truth of the matters stated, and the jury were to be judges of the law and the fact. The enactment of this statute was bitterly opposed by the Republican party of the day, who contended that it was not within the powers granted by the Constitution to the Congress; and though it was sustained by the courts, the prosecutions under it were unpopular and contributed to the defeat of the Federal party and the elevation of Mr. Jefferson to the presidency. The statute was temporary in its terms and expired by its own limitation March 4, 1801, and no similar statute has ever since been enacted or even seriously been proposed.

The general tendency of thought in the United States has been in the direction of imposing limitations upon liability for published communications instead of extending it. In the state prosecutions for libels which took place in England towards the end of the last century popular feeling in America was with the defence, and in the several State constitutions, as they were made or amended from time to time, there were inserted provisions declaring the full liberty of every citizen freely to speak, write, and publish his sentiments on all subjects, being responsible only for the abuse of the liberty, and in most of them it was provided that in prosecutions for libel the truth might be given in evidence and should be a defence if published with good motives and for justifiable ends. If in any State this privilege is not declared by constitution it is believed to be a part of its common law; so that the right to defend against a charge of libel, whether in a civil or a criminal prosecution, by showing that the publication was truthful and was made for justifiable ends, may be said to be universal in the United States. There are cases, however, in which the defence may be broader than this; cases in which the motive alone may be a defence though the publication proves to be untrue. Such cases are properly known as cases of privilege. Some of them are so absolutely privileged that even motive could not be inquired into, the only admissible inquiry being whether the party making the publication was at the time in the line of some duty which he had assumed, or of some privilege which the law had conferred upon him. A case of the kind is that of an attorney or solicitor, who, under the instructions of his client, incorporates in legal pleadings or other proceedings statements respecting an opposing party for the purposes of judicial investigation. Such statements often prove unfounded as well as injurious, but the officer is under no liability, civil or criminal, provided the allegations were pertinent to the case, and not dragged in merely that the opportunity might be taken advantage of for making them. Another very common case is where publication is made of proceedings taking place in judicial tribunals, in which case there is a like privilege, provided the proceedings are not *ex parte*, but such that both sides have opportunity to present the facts, and provided also the publication is impartial and fair. It is considered that the public has an interest in such proceedings which is paramount to that of any individual who may incidentally be injured by the publication. If, however, the proceedings are *ex parte*, the facility with which they might be made use of for the mere purpose of detraction and abuse is deemed ample reason for denying such a privilege of publication, and the publisher must at his peril ascertain what the facts are before he repeats the injurious *ex parte* charges of individuals, even though they be made in court.

Another case of absolute privilege is that of legislators. The American constitutions declare that they shall not elsewhere than in the legislative halls be called to account for utterances in debate; but the rule is broader than these words might seem to indicate, and applies to whatever they may say in committee or elsewhere in the discharge of legislative duty, and would no doubt apply also to papers prepared or made use of by them in their legislative capacity.

A question of great interest and not yet decided is, how far the publication of speeches and other legislative proceedings is privileged in America. The English courts have gone very far in restricting the privilege of publishing speeches made in Parliament, and especially in the great case of Stockdale *vs.* Hansard have held publishers to very strict accountability for the publication of untrue and injurious matter, even when the publication was only of a report made in Parliament and was in pursuance of parliamentary order. In the United States it was settled very early that legislative bodies ought to sit with open doors, and for many years not only Congress but the State legislatures as well have made provision by law for the complete publication by a State printer of all their regular proceedings, and this publication in the case of Congress embraces a complete presentation of all that is said in its open sessions. Whether the public printer would be held pecuniarily responsible in case the publication contained false matter affecting an individual injuriously is at least doubtful. It is not improbable that it would be held that what was absolutely privileged in utterance was also absolutely privileged in reproduction in the press when thus reproduced by authority of law and with completeness.

The most important case in which the privilege is qualified by motive and by a requirement of care to ascertain the facts is that of the criticism of the character and conduct of those who hold or are seeking public office or other responsible position. In such cases one who would bring them to accountability or defeat their aspirations may speak and publish freely not only what he knows that should have a bearing but also what he believes, provided he has reason for believing it and is not negligent in ascertaining the facts, and his mistakes of fact under such circumstances will not render him liable, provided he can justify his motives. What he does, however, should have some obvious tendency, if true, to accomplish the end at which he professes to aim. General abuse could not be sanctioned, but he should address what he has to say to the tribunal having power to correct or prevent the evil he professes to have in view. If one were seeking from the postmaster-general an appointment as deputy-postmaster, a protest reflecting upon his character addressed to any other authority would obviously be out of the line of privilege. Still it is somewhat difficult to draw close lines here, since in the case of an improper official or candidate the general enlightenment of the public on the subject may be important, and occasion might excuse or at least palliate a publication which proved to be untrue even when it did not fully justify it.

A most important question, which was much discussed some fifty years ago, concerned the privilege of criticism of books and works of art by the public press. Mr. J. Fenimore Cooper brought suits against several newspapers for criticisms of his published works. His complaint was that they were not fair criticisms of his works, but were aimed rather at the author than at his productions. He recovered in some cases, the court holding that fair criticism of works offered to the public by the author was fully privileged, but that the privilege must not be made a cover for attacks upon the author. If a publication that might otherwise be privileged were blasphemous, indecent, or otherwise unfit for publication, publishing it might be a public offence notwithstanding the general privilege.

(T. M. C.)

See Vol. XIV. p. 507 Am. ed. (p. 508 Edin. ed.).

LIBERIA is a Republic of American negroes in West Africa, lying between 6° 8′ and 4° 20′ N. lat. It extends coastwise 550 miles from the River Manna, near Cape Mount, to the River San Pedro on the east. The coast is low and flat, save the three elevations, Cape Mount, Monrovia, and Cape Palmas. The chief rivers are the Manna, Cape Mount, Mesurada, Bassa, Sanguin, and the Cavalla. The banks of these rivers for about 8 miles from the ocean abound with mangrove swamps, and at their mouths are obstructed by bars. The climate, so far as one's sensations are concerned, is delightful, there being no extremes of either heat or cold; but there is much actual unhealthiness, owing to marshes and malaria.

Liberia is doubtless the smallest of the civilized nations. The first settlers were American slaves. About 1816 their condition excited much interest in the United States, the result of which was the formation of the American Colonization Society with the twofold purpose of exporting free negroes to Africa and of planting there a Christian nation (see COLONIZATION SOCIETY). The first colonists, 82 in number, sailed from New York in 1820, on the ship Elizabeth, chartered by the United States. After a brief sojourn at Sherbro, near Sierra Leone, they took up a permanent residence on the heights of Mesurada, now called Monrovia. The emigration has continued up to the present, colonizing 15,788 persons, besides 5,722 recaptured Africans sent thither by the American government.

Besides the ordeal of tropical acclimation, the Liberian people have suffered from two other special causes. One of these was the jealousy of the natives, conscious of the skill and power of new people beside them and alarmed at their increase and probable mastery. Hence came bloody fights which have caused the emigrants much confusion and frequent loss of life. The other trouble was the presence on the coast of numerous traders, agents of English mercantile houses. These men, by the influence of gifts and trade, interfered with the rule of the colonial government. The colony had no national authority and was ruled by a governor sent out by the American Colonization Society. It could exert no authority over the traders nor get redress for wrongs from the nations represented by these traders. These difficulties forced the Liberians into premature national existence, and in 1862 they assumed the functions of a nation with the title of "The Republic of Liberia." The constitution is modelled after that of the United States. The president is elected biennially. There are two houses of legislation, a supreme and lesser courts, with judges and magistrates in each of the four counties into which the republic is divided.

The soil of Liberia is unequalled in richness and fertility. The sugar-cane grows from 15 to 20 feet in length, with great bulk, and requires no replanting for 6 or 7 years. The natural resources are marvellous, though as yet hardly developed. The rivers swarm with fish. Large beds of delicious oysters are dredged near the coast, and turtles and lobsters are found in abundance. Game of various kinds, both birds and animals, abound. The wild deer, bison, wild hog, are shot in all the settlements. The elephants in herds roam unmolested only a few miles from the seaboard.

Iron yielding 50 and often 80 per cent. is abundant. Gold and copper are brought from the interior. Precious woods, mahogany, ironwood, rose, black gum, and teak are so common that they are cut down and used for fire-wood. All the tropical fruits and vegetables are raised. Many of them grow wild in the bush. The cocoanut-palm grows everywhere. Lime-trees, sour and sweet oranges, pine-apples, plantains, and bananas are common products.

The population of Liberia is composed of American settlers, a few West Indian immigrants, a small influx of civilized British West Africans, and some 4000 or 5000 Congoes, Eboes and Dahomans, recaptured Africans. The whole of this class of the population amounts to about 15,000 persons, men, women, and children. But the bulk of the people in the territory of Liberia are uncivilized natives, members of the tribes known as Veys, Mandingoes, Bassas, Golahs, Pessas, Grebos (or Kroo), etc. It is supposed that these various tribes number fully 1,000,000. The Mandingoes and Veys are superior peoples. The Veys have a written language of their own invention.

The chief towns of Liberia are Monrovia, the capital, Buchanan, in Bassa county, the emporium of the palm-oil trade, and Harper, at Cape Palmas, which is the home of the Kroomen, the great sailors of the west coast.

Liberian schools and education are chiefly carried on by the missionary societies of America. The government has established a few schools in native towns. There are two or three schools of an academical rank; the Alexander High-school, Presbyterian, which has graduated several classical scholars; the Methodist High-school also flourished for several years. The most important educational movement in Liberia was the establishment of Liberia College in 1860, with a president and four professors.

Protestantism is the religion of the Liberian people, and churches of the several denominations have been built in the various settlements. By the laws of the republic all religions are tolerated, and freedom of worship is the common right of all citizens. The English language is used, and divine worship shows the same peculiarities seen in the churches of America.

There is no standing army. Once every quarter all able-bodied men over 18 years do militia duty in the different settlements. This system has hitherto proven sufficient for the national defence against the natives.

The Liberian traders push their way into the interior, and having got the consent of kings or chiefs establish factories in native towns for the sale of English and other goods; with these they enter into barter for palm-oil, camwood, ivory, and other native articles. These they send to the coast by native bearers to Liberian merchants, who in turn sell these products to the foreign traders. Agriculture, however, is the chief occupation of Liberians. The largest portion of the population devote themselves to farming. The chief articles of produce are sugar, coffee, arrow-root, ginger, cocoa, maize, and pea-nuts. Considerable quantities of sugar and molasses are manufactured for home consumption, and also shipped to Sierra Leone, Lagos, and other West African ports. The chief product of the soil is coffee. The banks of both the

St. Paul and the Bassa Rivers are lined with coffee plantations. In Mesurada county there are not less than 200 or 300 coffee plantations of various extent. This single county exported in 1883 to America 400,000 lbs. of coffee; exclusive of shipments to England, Germany, and other countries. The estimate for the whole county for the year was 800,000 lbs. It was in 1863 only about 1000 lbs. Much of the increase of the coffee-cultivation and trade may be attributed to the labors of Mr. Edward S. Morris, a merchant of Philadelphia, who at his own expense made a very full exhibit of Liberian products at the Centennial Exposition in 1876. He has also promoted the educational interests of the country.

Palm-oil is manufactured in considerable quantities by Liberians for foreign export both in Bassa and Cape Palmas.

Most of the exports of Liberia are native products, brought from the interior by native carriers. The caravans come at times a distance of 100 miles, bringing on their backs palm-oil, palm-kernels, camwood, ivories, rubber gum, etc. The imports into Liberia are tobacco, cotton goods, beads, fire-arms, gunpowder, kerosene, crockery, hardware, calicoes, beef, pork, lard, codfish, mackerel, lumber, etc.

The value of the imports and exports of Liberia for the fiscal year ending Sept. 30, 1884, was as follows:

	Value.	Duties.
Imports	$1,242,898.62	$99,431.89
Exports	1,445,785.50	28,915.71
Totals	$2,688,684.12	$128,347.60

The following table shows the number of vessels, domestic and foreign, entered and cleared, and the amount of tonnage:

Flag.	Vessels entered.	Vessels cleared.	Tonnage entered.	Tonnage cleared.
Liberian	61	61	1,939	1,074
English	56	55	99,670	98,116
German	16	18	20,475	24,093
Dutch	20	16	4,494	3,414
American	10	13	3,751	4,412
Total	163	163	130,329	131,109

(A. C.)

LIBRARIES, American Public. According to careful estimates there were in 1800 not more than 80,000 volumes in all the libraries in the United States. There are now reported to the Bureau of Education 4503 libraries of over 300 volumes each, possessing in the aggregate about 13,700,000 volumes. These libraries have developed on three lines: by subscription, by individual endowment, and by municipal support.

See Vol. XIV. p. 509 Am. ed. (p. 509 Edin. ed.).

Educational Libraries.—The earliest libraries in America were naturally connected with educational institutions, and may be briefly considered independently of the above division. They seem to have been generally used by the local reading public, their stricter adaptation to the uses of the faculty and students having arisen with the growth of public lending libraries. The first record of books dedicated to a public purpose in the American colonies is probably the following entry in the records of the Virginia Company of London; it refers to Henrico College, the first college in America, which was broken up by the Indian massacre of 1622: "Nov. 15, 1620. . . . A straunger stept in presentinge a mapp of Sr Walter Rawlighes, contayninge a Descripcon of Guiana, and with the same fower great books, as the Guifte of one unto the Company that desyred his name might not be made Known . . . wch books the Donor desyred they might be sent to the Colledge in Virginia, there to remain in saftie to the use of the collegiates thereafter, &c." College libraries at present differ from general reference libraries in the special privileges which are given to professors and students. These privileges differ in the various institutions; the tendency is to regard these libraries as primarily instituted for the benefit of the students and to increase accordingly their privileges of access to the books, taking them to their rooms, and in kindred matters. These libraries, as a rule, have the advantage as regards thoroughness, of a limited public, a definite aim, and a corps of specialists in the faculty. A list of the principal collegiate libraries will be found at the end of this article; where also will be found tables of the other kinds of library mentioned in the article.

Subscription Libraries.—Subscription or society libraries, or, strictly speaking, such of them as are of a general character, are, as a system, peculiarly an American institution; although there are examples in other countries. It is, perhaps, in their number and character that the literary advancement of the community is best indicated, for they are more directly the results of its own tastes and energies than are libraries founded either by private or governmental means. They may be divided into general and special, the latter being chiefly historical, theological, scientific, and legal. First in historical order are the general libraries used for entertainment and general culture rather than advanced or particular study. The Library Company of Philadelphia, originated by Benjamin Franklin in 1731, and incorporated in 1742, was, in his words, "the mother of all the North American subscription libraries." Franklin says that, "so few were the readers," he with difficulty procured 50 subscribers, "mostly young tradesmen." Though established and supported by private subscription the library allowed free reference to its books by the public, and they could be taken out by non-subscribers by payment of a small weekly charge. As a result of this library Franklin says that "Reading became fashionable . . . our people in a few years were observed by strangers to be better instructed and more intelligent than people of the same rank generally in other countries. . . . The institution . . . was imitated by other towns and in other provinces. . . . These (subscription) libraries have improved the general conversation of the Americans, made the common tradesmen and farmers as intelligent as most gentlemen in other countries, and perhaps have contributed in some degree to the stand so generally made throughout the colonies in defence of their privileges." Although, from Franklin's language and other reasons, we are justified in believing that more existed, the names of only 20 other subscription libraries have come down to us as having existed prior to the Revolution, viz., the Union, Association, and Amicable Companies, of Philadelphia; the Union Library, Hatboro', Pa.; the Darby (Pa.) Library; the Library Company, Chester, Pa.; the Charleston (S. C.) Library Society; the Winyaw Indigo Society Library, Georgetown, S. C.; the City Library, N. Y.; the Redwood Library, Newport; the Providence Library; the Portland (Me.) Library; the United English Library, Pomfret, Conn.; the Library Company, Burlington, N. J.; the Bridgeton (N. J.) Library; and the social libraries of Salem, Leominster, Hingham, Concord, and Brookfield, Mass. Several had their origin in clubs instituted for social entertainment. Besides these a circulating library was established in Boston in 1765, by John Mein, and apparently well patronized; and a reference "to the Public Library in Boston" is found in a will of 1764 and in the city records. About 20 other libraries, mostly collegiate, are recorded as having been established before 1776. The City Library, of New York, is said to have been established in 1700, and was probably the earliest lending library in America. From 1702 onward it was presented with a number of books by the Rev. John Sharp, an English chaplain at the fort in the city. In 1754 the present

New York Society Library was formed and the city turned over to it what remained of the City Library, which had been increased in 1730 by a bequest of 1642 volumes by the Rev. Dr. Millington, an English clergyman. Subscription libraries closely followed on the school-house and church in the western settlements. In 1796 a library was established at Marietta, Ohio, and in 1802 one widely known as the "Coon-skin Library" opened at Ames, in the same State, with books valued at $73, brought from Boston in a sack on the back of a horse. This library was so called because its original fund was procured by the sale of coon-skins. The money was hardly earned and the books were correspondingly valued, and are said to have exercised a wide influence.

Mercantile Libraries.—There has been a certain division, more of degree than kind, made in subscription libraries between what have been called "proprietary" libraries, of which the New York Society Library, Library Company of Philadelphia, and Boston Athenæum are prominent examples, and libraries which depend more upon their annual subscriptions. The latter class includes "Mercantile" libraries, Young Men's Associations, Apprentices' libraries, etc. The most important of these divisions, mercantile libraries, may serve as a type of all. They were primarily for the use of merchants' clerks, secondarily for general readers; but the distinction has been loosely observed. The chief differences of management between them and the "proprietary" libraries is that they do not confine themselves to the single function of furnishing books but combine with it an educational, lecture, or gymnastic department. Their books also are more entirely of a popular character, and they pay as a rule more attention to newspapers and periodicals. It is probable that, in common with other general subscription libraries, not many more, comparatively, will be added to those already existing; the tendency, seemingly, being to supply their places by free libraries supported by taxation. In this connection may be noticed the organization by voluntary subscription in New York in 1880 of the Free Circulating Library, an institution entirely free, which has according to its report of 1884 over 20,000 volumes, and a yearly circulation of over 100,000 volumes; and in Philadelphia a considerable sum has been subscribed to a project for a free public library. The first mercantile library was established in Boston in 1820. The New York Mercantile Library, now the most important of its class, was also founded in 1820. It was at first open only in the evening, and two directors were always in attendance. The librarian was paid $150 per annum. The leading publishers of the city agreed to present to it copies of all meritorious works published by them. In 1823 it was incorporated, and $40,000 was subscribed for a permanent building in 1828. In 1830 Columbia College granted perpetually to the Association two free scholarships, and in 1845 the University of the City of New York did likewise. Courses of lectures were given and classes formed in the French, German, and Spanish languages, chemistry, drawing, and penmanship. According to its report of 1885 it has a membership of 5261, and its circulation in that year was 133,509 volumes.

Historical Societies.—The number and activity of historical societies in America is noteworthy, and their development has probably been stimulated by the republican form of government. Since the Massachusetts Historical Society organized in 1791 more than 160 have been formed, most of which still exist. Several of the Western States have begun their State life with the organization of a historical society; the Minnesota Society was created by an act of its first Territorial legislature. The societies collect books, pamphlets, and miscellaneous relics. As libraries, their activity may be judged by the number of their books and pamphlets, which amount to considerably over 1,000,000; besides this, their collections contain about 100,000 MSS. The great mass of this material bears upon American history. Besides this preservative function the societies have published, chiefly during the past 75 years, matter equal to more than 300 octavo volumes of 350 pages each, containing town and church histories, private diaries, biography, travel, genealogy, deeds, reprints of rare books, etc., etc. They have also been influential in procuring measures by the State legislatures for the preservation and publication of records, etc., and have been active in assisting the publication of local histories. They may be divided into State and local societies. State societies are generally situated in the capital or principal city, and State history is a prominent object of their operations. The local societies generally restrict themselves to the history of the town or region whose name they bear. Owing largely to these societies, the history of the United States will, it seems probable, be preserved with a completeness heretofore unparalleled in any country, not merely in affairs of government but also in the minutiæ of manners and customs. The New York Historical Society, organized in 1804, originally included in its plan natural history, but its considerable collections on that subject were soon made over to the Lyceum of Natural History. About 1809 the association secured the papers of Gens. Gates and Schuyler, and of Cadwalader Colden; the first, perhaps, only second to those of Washington as materials for the history of the time. Its collections also include the Lord Sterling, Duer, and Steuben papers. It possesses about 4500 volumes of newspapers. The society's proceedings and collections amount to 30 volumes, besides a large number of pamphlets. Its art collection is probably superior to that of any other library in the country, containing over 800 oil-paintings, many exemplifying American art.

Scientific Libraries.—In scientific libraries the United States are by no means so well equipped. In Philadelphia the Academy of Natural Sciences possesses a library which in its special department has few rivals in any country. In ornithology and conchology it is particularly strong. It has been claimed, though this is doubtful, that in 1871 it lacked only two publications to make the latter department entirely perfect to that date. The library was established in 1812, and received valuable gifts from Wm. Maclure, Dr. Thos. B. Wilson, and Ed. Wilson. In 1834 Mrs. Thomas Say presented to it her husband's entomological library. The library is entirely one of reference, and as such is free to the public. The American Philosophical Society of the same city has also a good scientific library; and in applied science the Franklin Institute has a useful working collection. The Wagner Free Institute of Science has also a useful and well-used library of about 20,000 volumes. Washington City, owing to the libraries of the surgeon-general's office, of the patent-office, and other departments of government, is well equipped for scientific research. In New York and Boston the New York Museum of Natural History, New York Academy of Sciences, Boston Society of Natural History, and Cambridge Museum of Comparative Zoölogy are noteworthy.

Medical Libraries.—Important medical libraries are those of the Philadelphia College of Physicians, of the Pennsylvania Hospital (which is the oldest medical collection in the country, having been begun in 1763), and of the New York Hospital.

Theological Libraries.—Theological libraries are usually connected with seminaries. There are a few exceptions. The General Theological Library was established in Boston in 1860, with the design of collecting all works pertaining to theology, and is supported by various denominations. A library of similar character begun in Cincinnati was merged in the public library of that city. A few others, chiefly denominational and historical, are unconnected with seminaries. Altogether there are about 50 theological libraries of any importance. That of the Princeton

TABLE I.—*List of Libraries in the United States having over 20,000 volumes.*

Location.	Name	Founded.	Character and remarks	Number of volumes.	To whom accessible.
Albany, N. Y.	New York State Library	1818	General reference, Law library 37,728 vols.; 240 MSS.	128,529	Open (over 15).
Amherst, Mass.	Amherst College Library	1811	General; college library; includes 2 society libraries.	47,000	Members; o. b.p.
Andover, Mass.	Theological Seminary Library	1807	Theology. Some MSS.	43,000	Members.
Ann Arbor, Mich.	University of Michigan Library	1841	General reference; books lent only to professors	58,091	Open.
Annapolis, Md.	Maryland State Library	1826	Law, chiefly	70,000	Open.
Augusta, Me.	Maine State Library	1832	General reference, Law	40,000	Members Gov't.
Baltimore	Johns Hopkins University Lib.	1876	Science, History, etc. Founded by Johns Hopkins.	28,000	Members.
"	Maryland Historical Society Lib.	1844	History	20,000	Open.
"	Mercantile Library Association	1839	General, Popul.; pamphlets; books lent	36,000	Sub. ($5).
"	Peabody Institute Library	1876	General reference. Founded by George Peabody	84,726	Open (over 16).
Boston	Boston Athenæum Library	1807	General reference; History; printed dictionary cat.	149,910	Property; books; borrow ($5).
"	Congregational Library	1853	Theology, History, 135,000 pamphlets; 225 MSS.; life privilege	31,381	Open.
"	Mass. Historical Society Library	1791	History; American local history and civil war; 64,000 pamphlets; 1000 MSS.	29,000	Members (100).
"	New England Historical Genealogical Society Library	1845	History, Biography, General; MS. genealogies; 64,604 pamphlets	20,778	Open.
"	Public Library (10 branches)	1852	Books lent	453,967	Open (over 14).
"	State Library of Massachusetts	1826	Ref., Law and History; best collection U. S. Statutes	60,000	Open.
Brooklyn	Brooklyn Library	1857	Books lent	83,888	Members.
"	Long Island Hist. Society Library	1863	Reference, History, Fine Arts	40,000	Members.
Brunswick, Me.	Bowdoin College Library	1802	General reference; includes society libraries	40,000	Members.
Buffalo	Buffalo Library	1836	Books lent (formerly "Young Men's Library")	53,638	Sub. ($3).
Cambridge, Mass.	Harvard University (Central College and 9 Departments) Lib.	1632 1764	252,382 pamphlets; ballads, folk lore, Americana, maps, law, divinity, and zoölogy	304,753	Open for ref.; mem. borrow.
Chicago	Public Library	1872	Books lent	111,621	Open.
Cincinnati	Public Library	1856 1867	Gen., Med., Theol.; residents borrow free, others $5.	158,136	Open.
"	Young Men's Mercantile Library.	1835	Books lent	47,939	Sub. ($5).
Cleveland	Public School Library	1868	Books lent to residents	45,905	Open.
Columbus, O.	Ohio State Library	1817	General reference; Law	51,439	Open.
Detroit, Mich.	Public Library	1865	Books lent; 3 MSS.	60,000	Open (over 15).
Evanston, Ill.	North-western University Lib.	1857	General, Clas., Philosoph.; 8000 pamphlets	25,000	Members.
Frankfort, Ky.	Kentucky State Library	1821	General reference, Law	33,900	Open.
Georgetown, D. C.	Georgetown College Library	1791	Theol. and Coll. course; Obsv. Lib., 800 vols.; few MSS.	30,000	Mem. & visitors.
Hanover, N. H.	Dartmouth College Library	1769	General reference, books lent.	65,000	Members ($6).
Harrisburg, Pa.	Pennsylvania State Library	before 1777 formally 1816	General reference; Law; Document, History of State	53,000	Open.
Hartford	Conn. Historical Society Library.	1825	History; many MSS.	20,000	Open by permis.
"	Hartford Library Association	1839	Books lent	34,500	Sub. ($5).
"	Watkinson Library of Reference.	1858	Gen. reference; connected with Conn. Hist. Soc. Lib.	34,899	Open.
Haverhill, Mass.	Public Library	1873	Books lent	39,268	Open (over 12).
Indianapolis	Public Library	1872	Books lent	39,273	Open.
Ithaca, N. Y.	Cornell University Library	1868	Reference; contains libraries of Goldwin Smith, F. Bopp, C. Anthon; 16,000 pamphlets	60,300	Members.
Lansing	Michigan State Library	1828	General reference; Law; officers borrow	54,000	Open.
Louisville	Polytechnic Society of Ky. Lib.	1879	Scientific; lectures given	39,879	Members.
"	Public Library of Kentucky	1871		60,800	Open.
Lowell	City Library	1844		30,100	Subscription.
Madison, Wis.	Wis. State Historical Society Lib.	1849	General; American History; 57,796 pamphlets	55,361	Members ($2).
Middletown, Conn.	Wesleyan University Library	1833	College course; American History, Wesleyan History	35,000	Members.
New Bedford, Mass.	Free Public Library	1853	Books lent	48,600	Open (over 16).
New Haven	Yale College (and Libraries of Departments of Law, Science, and Divinity)	1700	Gen. ref.; Linonian & Brothers' Library; 200 MSS.	175,000	Members.
New York	Apprentices' Library	1820	General, Trades and Arts; $2 to others than apprentices and working women	63,000	Open to app's & journeymen.
"	Astor Library	1849	Gen. ref.; Tech. and Ling. Founded by J. J. Astor.	221,490	Open (over 16).
"	Columbia College Library	1754	Gen. ref.; books lent; includes Phœnix Library	50,000	Members.
"	Lenox Library	1870	Rare books. Founded by James Lenox; 1000 MSS.	25,000	By card on appli.
"	Mercantile Library Association	1820	Books lent	207,123	Subscription.
"	N. Y. Historical Society Library.	1804	History	75,000	Members; o. b.p.
"	New York Society Library	1700 1754	Gen.; Art, Novels published 1720-1820; books lent.	100,000	Prop.
"	Union Theological Seminary Lib.	1836	Theology; H. B. Smith Mem. Theol. Lib.; books lent; 47,000 pamphlets; 161 MSS.; 430 incunabula.	50,000	Members; o. b. p.
Philadelphia	Academy of Natural Science Lib.	1812	Natural History; reference; 40,000 pamphlets	35,000	Members; o. b. p.
"	Library Company of Philadelphia	1731	Loganian Library in Trust; Ridgway Branch. Founded by Dr. Jas. Rush; 150 MSS.	145,000	Sub.; ref. free.
"	Mercantile Library Company	1821	Books lent; 200 MSS.	152,741	Sub. ($4).
"	College of Physicians	1789	Med.; 13,934 pamphlets	35,079	Open.
Princeton, N. J.	College of New Jersey Library	1746	General reference; includes society libraries	72,000	Members.
"	Presbyterian Theol. Sem. Lib.	1812	Reference; Theology; books lent	50,000	Members.
Providence	Brown University Library	1768	Rich in hist., fine arts, clas., and patr. lit.; 20,000 pam.	65,000	Members; o. b. p.
"	Providence Athenæum Library	1836	Books lent	44,502	Sub. ($6).
"	Public Library			31,650	Open.
Raleigh, N. C.	North Carolina State Library	1831	General reference; Law	42,000	Open.
Richmond, Va.	Virginia State Library	1822	General reference; Law	44,000	Open.
Sacramento	California State Library	1850	General reference; Law	53,000	Open.
St. Louis	Public School Library	1865	Books borrow	56,192	
"	St. Louis Mercantile Library	1846	Gen. Amer. Hist.; books lent; propri. $5, desks $3.	62,264	Subscription.
Salem, Mass.	Essex Institute Library	1848	Ref.; Hist., special collection relative to Essex Co.	34,800	Members (350).
San Francisco	Free Public Library	1879	Books lent	45,004	Open.
"	Mercantile Library Association	1853 1863	Books lent	53,858	Sub. ($12).
South Bethlehem, Pa.	L. P. Linderman Mem. Library	1881	General reference; part of Lehigh University	50,000	Open.
Springfield, Mass.	City Library Association	1864	Books lent	50,960	Open.
University of Va.	University of Virginia Library	1825	College course; members borrow	48,000	Open.
Washington	Bureau of Education Library	1868	Education and libraries; 42,100 pamphlets	16,500	Use of depar't.
"	Department of State Library	1789	Ref., Law, Hist.; orig. docs. of founders of U. S.	36,000	Use of depar't.
"	House of Representatives Lib.	1789	Public Document	131,000	
"	Library of Congress	1800	National; senators and reps. borrow; copy printed.	396,000	Open (over 16).
"	Patent Office Library	1839	Technical, Patents; officers borrow	47,040	Open.
"	Surgeon-General's Office Library.	1865	Medical, Science; journals; 95,923 pamphlets	72,219	Open.
"	U. S. Senate Library	1852	Public Document	30,000	Senators.
Waterbury, Conn.	Silas Bronson Library	1870	Gen.; Fine and Indust. Arts; books lent; endow.	36,500	Open.
West Point	U. S. Military Academy Library.	1812	Military and Scientific; books lent; 19 MSS.	30,000	Members.
Williamstown, Mass.	Williams College Library	1793	General reference; includes society libraries	30,000	Members.
Worcester, Mass.	Amer. Antiquarian Society Lib.	1812	Reference, American History; 5000 vols. newspapers	85,000	Open.
"	Free Public Library	1859	Books lent to residents	61,204	Open (over 16.)

Theological Seminary is claimed as the best collection of theological literature in the United States. Of its 50,000 volumes 40,000 are theological works.

Law Libraries.—Besides the libraries of the different States, and of the law departments of universities, there are about 40 law libraries in the United States supported by associations. They are, as a rule, strictly reference-libraries, free to their respective members and by courtesy to the bench. Among the most important are the library of the New York Law Institute, the Social Law Library of Boston, library of the Law Association of St. Louis, of the Law Association of Philadelphia, Cincinnati Law Library, Library of the Baltimore Bar, and of the Bar Association of the city of New York. It is believed that it would be difficult to find a citation illustrative of the common law in any English or American law-book which any one of these libraries could not furnish the means of verifying. A free law library, the only one of private endowment in the United States, was established in Philadelphia in 1885 by the bequest of Mr. Lucas Hirst.

Patronymic Libraries.—Libraries established by private endowment have, as a rule, been general in their character; although often favoring some particular department of knowledge, and paying slight attention to light literature. The first private endowment was the Loganian Library, founded in Philadelphia in 1745 by James Logan, the friend and agent of Penn. In that year he conveyed to the city a lot of ground, with the first building erected in America for library purposes, and his own valuable collection of books. His will says, "In my library which I have left to the city of Philadelphia, for the facilitating and advancement of classical learning, are above 100 volumes of authors in folio, all in Greek, with mostly their versions; all the Roman copies, without exception; all the old Greek mathematicians. . . . Besides these are many of the most valuable Latin authors, and a great number of modern mathematicians. . . . The room, books, and salary I cannot value at less than £2000, solely designed for the use of the public, in order to prevail upon them (having such assistance) to acquaint themselves with literature." The books were free for reference, and could be taken out without charge, their return being guaranteed by a deposit. Connected with this library is possibly the only hereditary office in the United States. When it was, shortly after its institution, annexed as a branch of the Philadelphia Library Company, it was enacted that one of the descendants of Logan should always be a trustee. In 1747 Abraham Redwood gave to a literary society, founded in Newport in 1730, by Bishop Berkeley, £500 sterling towards the establishment of a library. Both the Redwood and Loganian libraries are still in active operation. The practice thus begun has continued, and, as will be seen by the tables, has increased greatly within the last thirty years, until probably the most valuable portion of the works to-day accessible to the public are the fruits of private liberality. Of these gifts the Astor Library, although inferior to some in the amount of its endowment, is probably at present the most useful. It was founded in 1848 by the bequest of $400,000 by John Jacob Astor; since then the sum has been more than doubled by gifts of his son, Wm. B. Astor. Washington Irving was the first president of its board of trustees. The library may be said to contain entirely works of solid value, and is for reference only. In 1883 it was made use of by 72,584 readers. Two endowments which have not yet taken full effect may be here mentioned: that of Walter L. Newberry of $2,000,000 to the city of Chicago, and that of Mortimer F. Reynolds of $600,000 to Rochester, N. Y. A late and important gift is that of Enoch Pratt, of over a million dollars, to the city of Baltimore for library purposes. Mr. Pratt himself supervised the erection of his building, which was opened to the public in January, 1886, and retains an influence in its management. The private benefactions reported to 1876 amounted to $15,000,000, and it was estimated that there were others amounting to as much more which had not been reported. Five-sixths of the whole sum has been given within the last thirty-five years.

Common School Libraries.—The inception of the idea of free public libraries established and supported by the municipality is found in a message of Gov. Clinton to the legislature of New York recommending the formation of common school libraries. In 1835 a law was passed in that State permitting the voters in any school district to levy a tax of $20 to begin a library, and a tax of $10 each succeeding year to provide for its increase. Few districts voted the tax. In 1838 a law was passed giving to the school districts $55,000 to buy books, and requiring them to raise by taxation an equal sum for the same purpose. Under this stimulus the libraries had, in 1853, accumulated 1,604,210 volumes. Since then the number has annually decreased and is now about 700,000. Over $2,000,000 was expended by the State in this experiment. Faulty legislation and maladministration are given as a reason for the failure. Similar laws have been passed in most of the States, and in some the system is still active; in the majority it has been superseded by free libraries, supported partly or wholly by the municipality.

Free Public Libraries.—These libraries are the outgrowth partly of the school libraries, partly of subscription libraries. As stated by the editors of the Government Report on Libraries, "They are designed to furnish to all without cost the means for instruction and recreation which the social libraries provided for members only; and to perform the functions of public school libraries in the education of the people; and are so planned as to avoid certain difficulties which the latter met and could not overcome." Whether it is a function of government in America to furnish the means of "recreation" is a question which, as connected with libraries, it only falls within the province of this article to notice. But the statement is borne out by the amount of fiction used in these libraries, varying from 60 to 80 per cent. of the total use.

It has also been objected that in America government established for certain well-defined purposes of protection and convenience has never encouraged citizens to look to it for aid in any case where the object sought is attainable by private enterprise; and that the establishment of libraries by the municipality would do more to deteriorate than to foster that self-dependent spirit which is a chief end of education; also that it is a violation of the principle of freedom to levy taxes for such a purpose. These objections are made to the fundamental principle of the system; others less radical are that books are now so cheap, and privately endowed and subscription libraries so plentiful and accessible, as to obviate the necessity of taxation and the creation of new fields for the corrupt mismanagement of politicians; also that books too readily accessible are not valued. It is believed that the first instance of municipal aid to a library in the United States was in the case of the Bingham Library, a small collection of books given in 1803 by Caleb Bingham in Connecticut, and supported by occasional grants of money by the town. The towns of Orange, Mass., in 1846, of Castine, Maine, about 1827, and of Peterborough, N. H., 1833, are other instances of municipalities assuming the power to levy taxes for library use without the authorization of any State law. In some cases also special laws were enacted giving to certain cities and towns power to establish a free library by taxation. The first general law on the subject was enacted by New Hampshire in 1849, and authorized towns to grant money for establishing public libraries; the amount of such grants to be fixed by the voters of the respective towns. A law for the same purpose was passed in Massachusetts in 1851, the origin of which is instructive. In 1847 Dr. Francis Wayland, the president of Brown University, gave $500 to the town

TABLE II.—*Public Libraries of the United States, arranged by Classes and States.*

This table is compiled from the reports of the Commissioner of Education, and is brought down to 1885. The classes of libraries into which the table is divided are the same as given in the reports, with the exceptions that the classes "College," "College Society," "Academy," and "School," given separately in the reports, are here all included in the class "Educational," that Government and State libraries are brought together, and that the unclassed libraries of the reports are included in "Miscellaneous." Abbreviations: "A. and R.," Asylum and Reformatory; "Y. M. C. A.," Young Men's Christian Association.

States and Territories.	Historical.	Scientific.	Medical.	Law.	Theology.	Educational.	Social.	Public.	A. and R.	Y. M. C. A.	Mercantile.	State and Gov.	Garrison.	Miscellaneous.	Total.
Alabama	1	.....	1	1	....	27	3	....	....	1	.....	1	.....	....	35
Alaska	.....	.....	.....	....	....	....	....	....	....	....	.....	.....	1	....	1
Arizona	.....	.....	.....	....	....	....	....	....	....	....	.....	2	2	....	4
Arkansas	.....	1	.....	....	....	4	1	....	....	....	1	1	1	....	9
California	3	1	1	2	2	49	26	6	4	1	1	2	4	8	110
Colorado	.....	2	.....	1	....	11	1	....	1	....	.....	1	.....	2	19
Connecticut	4	3	3	2	5	51	41	10	7	3	.....	1	.....	35	165
Dakota	.....	.....	.....	....	....	....	1	....	....	....	.....	1	2	....	4
Delaware	1	.....	.....	2	....	....	8	6	....	....	.....	1	.....	2	20
District of Columbia	.....	3	1	2	2	12	3	1	4	2	.....	30	1	3	64
Florida	.....	.....	.....	....	....	3	1	1	....	....	.....	2	.....	1	8
Georgia	1	.....	4	1	....	37	5	1	....	....	.....	1	1	4	55
Idaho	.....	.....	.....	....	....	1	....	....	....	....	.....	1	.....	1	3
Illinois	2	8	2	7	8	92	44	25	6	3	1	1	1	27	227
Indiana	2	2	.....	2	1	50	15	60	4	4	.....	1	.....	8	149
Indian Territory	.....	.....	.....	....	....	2	....	....	....	....	.....	1	2	....	5
Iowa	1	2	.....	3	1	53	19	11	5	1	.....	1	.....	4	101
Kansas	1	2	.....	1	2	15	5	....	2	1	.....	1	2	8	40
Kentucky	1	.....	2	3	3	62	7	2	3	....	.....	1	1	....	85
Louisiana	.....	2	2	1	....	23	3	1	1	1	.....	1	.....	3	38
Maine	1	3	1	9	2	42	12	11	4	2	2	1	.....	10	100
Maryland	1	1	2	1	4	47	13	1	10	1	1	2	.....	6	90
Massachusetts	7	18	12	16	9	89	104	182	30	8	1	1	2	41	520
Michigan	1	2	1	4	1	64	28	21	6	4	.....	1	2	59	194
Minnesota	1	.....	.....	1	3	19	14	....	3	1	.....	1	.....	3	46
Mississippi	.....	.....	.....	1	1	23	3	....	1	....	.....	1	1	5	36
Missouri	2	2	4	5	1	58	15	....	3	....	2	1	1	10	104
Montana	.....	.....	.....	....	....	....	1	....	....	....	.....	1	.....	1	3
Nebraska	.....	.....	.....	1	....	8	4	1	2	....	.....	1	2	6	25
Nevada	.....	.....	.....	....	....	3	2	....	1	....	.....	1	.....	1	8
New Hampshire	2	3	1	....	....	31	29	17	4	1	1	1	.....	14	104
New Jersey	3	1	.....	....	4	42	25	3	5	11	.....	1	.....	18	113
New Mexico	.....	.....	.....	....	....	3	....	....	....	....	.....	1	1	1	6
New York	8	18	14	38	11	400	95	16	65	17	2	2	8	50	744
North Carolina	.....	.....	.....	....	1	34	3	....	1	....	.....	1	.....	2	42
Ohio	2	6	6	5	12	130	34	14	15	12	1	1	.....	15	253
Oregon	1	.....	.....	....	....	9	5	....	1	....	.....	1	.....	3	20
Pennsylvania	12	11	10	26	17	160	92	5	30	18	2	2	.....	41	426
Rhode Island	2	.....	2	1	....	18	16	24	5	2	.....	1	1	16	88
South Carolina	.....	.....	1	....	2	18	4	....	....	3	.....	1	.....	3	32
Tennessee	1	.....	.....	1	....	56	8	3	2	1	.....	1	1	2	76
Texas	.....	.....	.....	1	1	30	6	....	1	1	.....	1	5	3	49
Utah	.....	.....	.....	....	....	3	2	....	....	....	.....	1	.....	2	8
Vermont	1	1	.....	....	1	32	23	7	6	1	.....	1	.....	9	82
Virginia	2	4	1	....	4	40	11	....	2	2	.....	1	1	1	69
Washington Territory	.....	.....	.....	....	....	4	....	....	....	....	.....	1	.....	....	5
West Virginia	.....	.....	.....	....	1	17	2	....	1	1	.....	1	.....	....	23
Wisconsin	1	2	.....	2	1	50	21	6	4	....	.....	1	.....	4	92
Wyoming Territory	.....	.....	.....	....	....	....	2	....	....	....	.....	1	.....	....	3
Total	65	98	71	140	100	1,922	757	435	239	103	15	83	43	432	4,502

of Wayland for a library, on condition that the town raised an equal sum by subscription. This was done, and the gift accepted at a town meeting. Here the question arose whether the town, in its municipal capacity, could grant money to support a library. The point was solved by the recommendation "that it be optional with the individual tax-payers either to pay or not to pay their respective assessments for said item." This occurrence gave rise to the law. The laws passed by the various States since then for the purpose, have, as a rule, been freely acted upon. It is evident that their effectiveness depends upon the consent of the tax-payers. And on this point 37 towns in Illinois, Iowa, and Massachusetts in 1875 gave interesting information. In 32 towns the vote on the law was practically unanimous in favor of a library. The aggregate number of votes of 27 of these towns was 26,304; the remaining 5 did not report their number. In 5 towns containing altogether 3702 voters there were 515 votes against and 1730 for. The Boston Public Library, opened in 1854, is the foremost example of its class in the world. Its present building was dedicated in 1858, and with the land cost about $365,000. It has ten branches in different parts of the city, the first of which was established in 1870; and employs 146 persons, the majority women. The number of its books is 453,967. The total circulation of the library for 1885 was 1,027,393. The first registration of the names of applicants for the privileges of the library numbered 17,066; the second 52,829; the total number to May, 1885, has been 217,701. The library has practically two main divisions, "Bates Hall" and the "Lower Hall" and branches. Bates Hall "is especially for the use of advanced students. . . . The Lower Hall and branches are intended for persons who seek in the library only a means of relaxation or of the prosecution of comparatively simple studies. . . . Bates Hall contains 269,596 volumes. It is thus in itself the second library in the country in size; and it is probably equal to any in the quality of the books which it contains. The circulation of the books in Bates Hall has increased from year to year. It can never be large in proportion to the number of volumes . . . nor to the amount of money expended. . . The Lower Hall contains 40,576 volumes. These are of a popular character, comprising history, biography, travels, and science, with a great deal of fiction; but, if the supply of fiction is great, the demand is greater. The books in the Lower Hall circulate much more rapidly than those in Bates Hall . . of English prose fiction . . . there are 14,552 volumes. The circulation of these books was 107,142. The average circulation per volume was 7.36 times a year. Nor do these figures tell the whole story, for several thousand volumes of fiction are practically unread, but are counted in the number of volumes above given, thus bringing down the average of circulation." The use of fiction and juveniles is about 75 per cent. of all books used in the Lower Hall and branches. A feature of the library is the employment of policemen to inquire about suspicious applicants for registration living on their beats. The Chicago Public Library, founded in 1873, has 111,621 volumes. The proportion of works of fiction, juveniles, and miscellaneous literature used is nearly 80 per cent. In 1884 a system of delivery stations was adopted; and there are at present six in various parts of the city. They afford one of many instances of the effect of accessibility in increasing reading, as in one year they have increased the circulation of the library by 65,000 volumes. Among other methods adopted by this library for influencing education in the public schools is the delivery of lectures by its librarian within the building to classes of scholars. The lectures are illustrated by the books of the library; thus the endeavor is to show the methods of gaining information while imparting it.

As further illustrating the connection sought to be established between public schools and libraries, may be mentioned the plans of the Quincy (Mass.) Public Library, and the Wells School, Boston. By that of the former each of the local schools became practically a branch library, the master selecting a number of books from the public library and circulating them among his pupils. The plan of the latter is to lend to a school a sufficient number of copies of some chosen book to enable it to be read simultaneously by all the pupils, who are examined once a week in a conversational manner concerning it.

Government Libraries.—Besides the municipal libraries, of which the Boston, Cincinnati, and Chicago public libraries are the most prominent examples, there are State libraries and libraries of the general government, to which the public have access, although they are primarily intended for the use of the State legislatures and the officers of government. Foremost among these is the Library of Congress, which is almost coeval with the existence of the present government of the United States; the Continental Congress having been dependent for library aid upon the Library Company of Philadelphia, the use of the books of which was tendered to them gratuitously. In 1882 the first gift of a large library to the nation was made by the transfer of the medical library of Dr. J. M. Toner to the Library of Congress; it numbered 27,000 books and 12,000 pamphlets. Besides this there are libraries of the House of Representatives, of the Senate, and of the various departments, aggregating over 700,000 volumes, of which the most valuable is that of the surgeon-general's office.

State Libraries.—State libraries exist at present in every State and Territory, if the name may be applied to the collections of the latter. In 1836 Congress appropriated $8000 for the purchase of a library for Wisconsin Territory, and it has come to be the rule to appropriate in the act organizing a territorial government funds for the establishment of a library. A primary cause in the original establishment of State libraries was a resolution of Massachusetts in 1811 requesting the secretary of state to take measures to secure an annual exchange of statutes for the use of the executive and legislative departments. This began the series of exchanges now existing between the States, and started the foundation of State libraries. The scheme of international exchanges, originated and carried out by Alexander Vatteman, also tended to develop them. Sixteen States accepted the expense of the system, and as early as 1856 Mr. Vatteman had sent from France alone, besides those from other parts of Europe, 100,000 volumes. The library of New York State is the largest and most complete.

From this brief summary of the library system of the United States may be seen the change in the conception of a library which has of late years taken place. Formerly it was regarded as a storehouse of books, to-day half the librarian's business is to teach through his books and catalogues, and to aggressively force his books upon the public. The progress has been swift from the proprietary, through the mercantile and common school libraries, to the absolutely free public library. (B. S.)

LICENSE, in its original sense, is a legal permission from the proper authority which warrants the performance of duly specified acts. It may be merely a permit to pass into or through a certain building, to enter upon or to occupy a particular piece of land, to trade in certain specified goods, or to pursue a given calling. Licenses usually are not obtainable without the payment of money, but the conditions under which they are granted, or forfeited, are prescribed by law.

Licenses and license laws, which now have to do with many different and altogether unlike objects and occupations, appear first in connection with matters and callings possessing elements of danger, as the manufacture and handling of gunpowder, or which are in themselves immoral, hurtful, or liable to abuse. The ground upon which the licensing system rests is the right of the State to control any business carried forward within its territory which without special precaution may become dangerous to the public welfare, and the duty of the State to protect its citizens when such business threatens the morals, the bodily health and safety, or the property of any community.

License seems to have had its formal appearance in English history within a century after the landing of William the Conqueror, when, in 1161, certain "stews" along the Thames, visited mainly by lewd fishermen, were licensed by the 8th Parliament of Henry II. Efforts to abate the nuisance in 1506 resulted in reducing the number from 18 to 12, and they were finally closed by Henry VIII. in 1546.

England has had four general licensing acts respecting the liquor traffic. The first, entitled "An Acte for Keepers of Ale-houses to be bound in Recognizaunces," passed in 1552 during the short reign of Edward VI.; the second, in the reign of George II., 1753; the third, in the reign of George IV., 1828; and the fourth, in the reign of Victoria, 1872.

Considerations connected with the raising of revenue drew attention to inns and taverns as early as 1200, though before and after this date they were for the most part under municipal control until the general act of 1552. The next year it was enacted that no town should be granted more than 10 taverns, except London, which might have 40, and 21 other cities, each named in the bill, with the number to which they were entitled. The liquor traffic was now made dependent upon a legal sanction, which might or might not be given periodically, and upon the keeping of certain conditions which were deemed important. In 1603 license was granted by letters patent, and the following year a long preamble shows what Parliament then held to be the legitimate use of a tavern.

A tax was laid upon ale and beer by the Long Parliament in 1643 under the new name "excise," probably an anglicizing of the Belgian "accüse," signifying tribute. This example set at Westminster was copied by the royalists at Oxford. Both sides affirmed that this excise tax should cease with the closing of the war; but so easy a way to obtain revenue was not to be quickly relinquished. It was therefore not only continued, but soon after it was applied to many other commodities. Blackstone well says of excise "that from its first original to the present time its very name has been odious to the people of England." Yet from the time of the civil wars onward licenses began to be issued for a great variety of objects, and became more and more involved with excise or tax legislation. (See EXCISE in ENCYCLOPÆDIA BRITANNICA.)

American law and legislation in this, as in other matters, is grounded upon that of Great Britain. In the United States a license is most commonly an authoritative permit to keep a tavern, hotel, or saloon, to sell merchandise by auction, to peddle goods, to keep certain animals, or to conduct entertainments. It is the sovereign right of every State or municipality in the interest of good morals, or for the purpose of securing the public health, to make and to maintain efficient police regulations. In order to this any one proposing to pursue a calling fraught with abuses, or in which they are quite likely to arise, may be required to obtain a license from the proper authority. In general law a license is simply a permit revocable by the authority issuing it, and it dies with the death of either party; it does not carry any interest, and cannot be assigned.

In the United States the national authority is paramount to that of any State; hence a State license to do anything which violates the law of the nation is null and void. License fees imposed by federal authority as a tax for revenue only cannot interfere with anything allowed or prohibited under State laws. The federal license tax, which liquor-dealers are required to pay, does not warrant the sale of liquors in any State, where, as in Maine, Iowa, and Kansas, such sale is forbidden by the State law, or in any city within the bounds of such State. It is not a permit to do business, but a governmental tax upon such business if carried on.

The Plymouth Colony enacted its first license law in 1636; other laws followed in 1646, 1661, 1695, 1698, and 1710. The many acts, each adding some new restriction, indicate the frequency with which the liquor traffic came under consideration. After the adoption of the State constitution, the provisions of existing laws were codified, and with additional provisions were included in the general act of 1787, which has remained the law substantially until within about forty years.

The Continental Congress took account of this question in 1774, and in the first Congress of the United States the liquor traffic was the subject of the second bill it passed, which bears date July 4, 1789. The most elaborate measure was passed March 3, 1791, and May 8, 1792, in the second Congress, a law was enacted licensing distilleries, providing penalties for working stills without a license, and that the secretary of the treasury should have power to regulate the marks to be set upon casks and packages containing distilled spirits, without which they were liable to seizure. An act passed June 5, 1784, in the third Congress, entitled "An act laying duties on licenses for selling wines and foreign-distilled spirituous liquors by retail," contained this provision: "That no license shall be granted to any person to sell wines or foreign-distilled spirituous liquors who is prohibited to sell the same by the laws of any State."

License laws obtain in most of the States, varying but little from each other. They are all for the most part grounded upon the laws of Massachusetts and New York, the States which have perhaps had the most to do with license legislation. The law in Tennessee is noteworthy for its provision forbidding any person to sell or "tipple any intoxicating beverage within four miles of an incorporated institution of learning." That of Florida for a section requiring every application for license to sell liquors, wine, or beer "to be signed by a majority of the registered voters in such election district . . . which said signing shall be in the presence of at least two credible witnesses." Local option, or the right of towns, villages, or counties to prohibit the traffic within their borders, obtains in Maryland, North Carolina, South Carolina, Georgia, Texas, and Arkansas; and prohibition by statutory law in New Hampshire and Vermont, and by constitutional provisions in Maine, Iowa, and Kansas.

High license, differing in degree only, but not in kind, from the general licensing system, is receiving much attention in many parts of the country. High-license laws were passed in Nebraska in 1881 and in Illinois in 1883.

Certain general features are found in all license laws, viz.: (1) that licenses are to be issued only to proper persons; (2) that each one shall contain conditions of a restrictive character; (3) that special regulations as to the hours of opening and closing shall be enforced; (4) that all licensed places shall be kept under vigilant control; (5) that all violations shall be punished; and (6) that in granting any and all licenses the requirements of the neighborhood shall be duly considered.

In international law its most common use is to permit the pursuit of trade interdicted during war. Such permits are given usually by the sovereign authority of any country, but in time of actual conflict may be issued by military or naval officers in command of any given territory. It is of the nature of a special contract, and must be limited to the individual receiving, and for the purposes named, unless otherwise ordered and expressly stipulated in the license.

In ecclesiastical law a license is a permit from the proper authority, which may be church, council, conference, or individual official, to preach, to administer ordinances, or to conduct religious services. The source of the authority, as well as the scope of the power committed, will vary with the tenets and practices of the various branches of the Christian church. In some instances the territory within which gifts may be exercised is no less prominent or important than the things specified which may be lawful for the licensee to do. (A. G. L.)

LIDDELL, HENRY GEORGE, an English clergyman, was born at Easingham, Durham, in 1811. He was educated at Christ Church, Oxford, graduating in 1833, and becoming tutor in the college. He was afterwards head-master of Westminster School, and domestic chaplain to Prince Albert. In 1855 he was made dean of Christ Church, and in 1870 vice-chancellor of the University of Oxford. He is best known by the valuable *Greek Lexicon* (1843; 6th ed., 1869) which he prepared in connection with Rev. Robert Scott, and by his *History of Rome* (1855), which has passed through many editions.

LIDDON, HENRY PARRY, an English clergyman, was born in 1830. He was educated at Christ Church, Oxford, where he graduated in 1850. Having taken orders he was vice-principal of the theological school at Cuddesden, 1854–59. In 1864 he was appointed prebendary in Salisbury Cathedral, in 1866

Bampton lecturer, and in 1870 a canon of St. Paul's, London. He was also made professor of exegesis at Oxford. He is an earnest defender and expounder of High-Church doctrine. He has published *Lenten Sermons* (1858); *The Divinity of our Lord* (1867); *Some Words for God* (1869).

LIE, JONAS LAURITZ EDEMIL, a Norwegian novelist, was born at Eker, near Drammen, in 1833, and spent his youth in Tromsö, the life and scenery of which he has well depicted in his works. Among these are *Den Fremsynte; Billeder fra Nordland* (1870); *Adam Schrader* (1879); *Livsslaven* (1883); *En Malström* (1884). Some of these have been translated into English.

LIFE-SAVING SERVICE, U. S. This is an organization, under the U. S. Treasury Department, for the succor or rescue of seafarers subjected to shipwreck upon the sea and lake coasts of the United States. With the exception of a small Danish establishment upon the coast of Jutland it is the only governmental institution of the kind in the world, all others being founded and carried on by private societies. It is likewise distinguished by the magnitude of the scale on which it is cast—its programme including all points of danger on ten thousand miles of rough coast; and by the extraordinary success which has attended its efforts to save life and property upon occasions of marine disaster.

See Vol. XIV. p. 573 Am. ed. (p. 570 Edin. ed.).

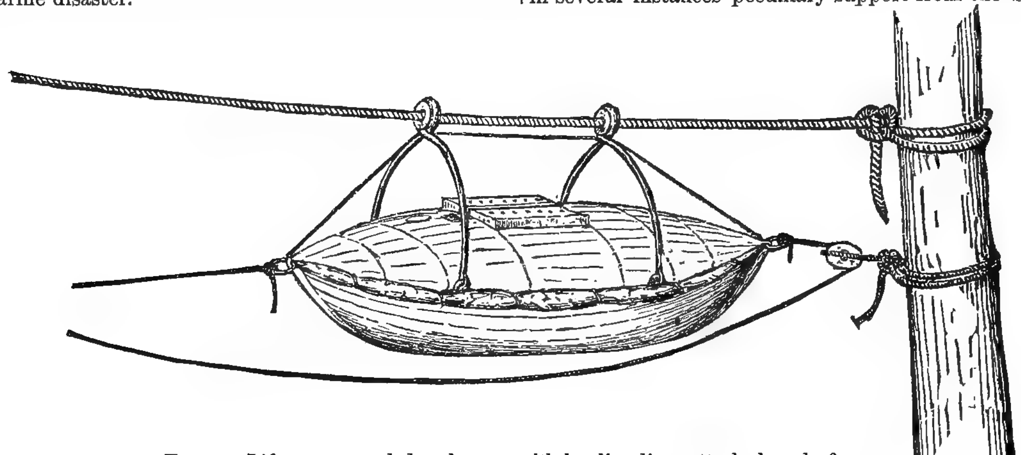


FIG. 1.—Life-car suspended on hawser with hauling lines attached ready for use.

For the two centuries prior to its organization the service rendered upon the coast to distressed or imperilled seafarers was necessarily of the most extemporaneous and inadequate character. The pathways of shipping were confined for a long period solely to the Atlantic seaboard, and none in the world can be more fraught with peril to incoming vessels. The coast from Maine to Cape Cod is dense with submarine rocks and reefs; thence to North Carolina there is an almost unbroken stretch of shoals and bars; and it hardly needs the concomitants of impervious fogs, blinding snowstorms, and shattering gales and seas, to add to the danger of navigation. At a later period commerce had to encounter the perils of the lakes—swift-piling waters, winds of indescribable suddenness and fury, and shores with but few havens of refuge; but until within the present century the Atlantic coast was the main field of marine disaster, and the history of its beaches was mainly made up of a long succession of tragic shipwrecks. No official record of such disasters was kept until 1871, and tradition and legend, or at most brief report, alone preserve the story of this protracted and dread mortality. A few tales reach us from the colonial period of the annual losses of brigs and barkentines laden with colonists who perished without aid in sight of land. In later years, when the great influx from Europe had set in, the emigrants went down by the shipload annually—200 and 300 at a time. In many cases wretched companies of men, women, and children, were for days in the sight and often in the hearing of the spectators on the beach until their vessels were beaten to pieces by the waves, and all on board went down into the whelming sea. There were no adequate means or appliances for rescue. Whatever gallant and desperate attempts at succor could be made by the coast population were undertaken in the face of every obstacle. Such efforts were, of course, commonly without result. The ordinary boats available were totally unfitted to cope with the surf of a violent storm, and to venture out in them to the relief of an endangered ship's company would have involved certain death. Hence, nearly two hundred years of ghastly and almost unmitigated fatality.

The first organized effort to rescue or to shelter shipwrecked mariners was made by the Massachusetts Humane Society in 1789, when it began to erect huts at intervals along the shore, "for the succor of persons escaping from wrecked vessels on exposed and desolate parts of the coast of Massachusetts." In 1807 the first life-boat station was built by this society at Cohasset, and subsequently a number of others. Upon occasions of service the boats of these stations were under the disadvantage of being manned by volunteers, instead of trained and disciplined crews. Still they effected sufficient good to be publicly recognized, and to receive in several instances pecuniary support from the State of Massachusetts and from the general government. The sum of $5000, which had been appropriated in 1847 to enable the light-house keepers to render assistance to shipwrecked mariners, having been unused, was given in 1849 to the society. In 1855 Congress voted it the further sum of $10,000; in 1857 $10,000; and in 1870 $15,000.

The winter of 1846–47 was exceptionally severe and the loss of life from shipwreck proportionately heavy, especially on the coast of New Jersey. One huge emigrant ship after another, while making for the port of New York, was driven on the Jersey beaches and there remained until beaten to pieces by the fury of the the waves. On one of these vessels nearly 400 lives were lost; on two others, 300 each. The whole country was startled and roused to action by these appalling disasters, and the Hon. William A. Newell, of New Jersey, brought before Congress the condition of the seaboard of that State, and asked for means to procure appliances for the rescue of life, pledging that they should be faithfully used by the people on the coast. An appropriation was made of $10,000 "for providing surf-boats, rockets, carronades, and other necessary apparatus for the better preservation of life and property from shipwreck on the coast of New Jersey lying between Sandy Hook and Little Egg Harbor," and with this money eight stations were built and equipped between the points specified. This action may be considered as the nucleus or germ of the service, which continued to grow by accretion. In 1849 the further appropriation of $20,000 was made by Congress, by which the work was pushed to the shores of Long Island. Eight stations were built and equipped between Montauk Point and Coney Island, one on Fisher's Island, one at Eaton's Neck in Long Island Sound, and six additional on the New Jersey coast. In 1850 $20,000 more was appropriated. With a part of this sum additional stations were built on Long Island, and one at Watch Hill, R. I. Half of the appropriation was used in distributing Francis life-boats along the coasts of North and South Carolina, Georgia, Florida, and Texas. In 1853–54 $42,500 were appropriated. With this sum life-boats were placed at certain points on the coasts of the great lakes, fourteen new stations were built on the coast of New Jersey, and eleven on the coast of Long Island.

A prominent appliance for saving life from shipwrecks, the life-car (Fig. 1), belongs to this period, having been introduced about 1848. It may be described as a covered boat made of corrugated iron. The corrugations of the metal make it retain its shape as a boat, without the aid of ribs or stays, thus securing its strength of build without increasing its weight. A hawser being stretched between the wreck and the shore, the car is suspended to it by iron bails, and is drawn back and forth above or on the water, bringing in at each trip a load of living persons. The top of the car is fitted with a hatch or lid, which is shut down upon the people making their transit, and a few perforations in the cover supply them with the necessary air. Six or seven persons, grouped in a recumbent position, are accommodated by the contrivance at each passage. It is remarkable as the first device by which life could be saved from a wreck without exposure or danger. It was first used at the wreck of the emigrant ship Ayrshire on Squan Beach, New Jersey, near Point Pleasant, when 200 persons were safely drawn ashore, comprising all on board save one man, who was lost by recklessly attempting to make the passage on the outside of the car, and was washed off into the sea. This is the only life ever lost by the operation of the life-car.

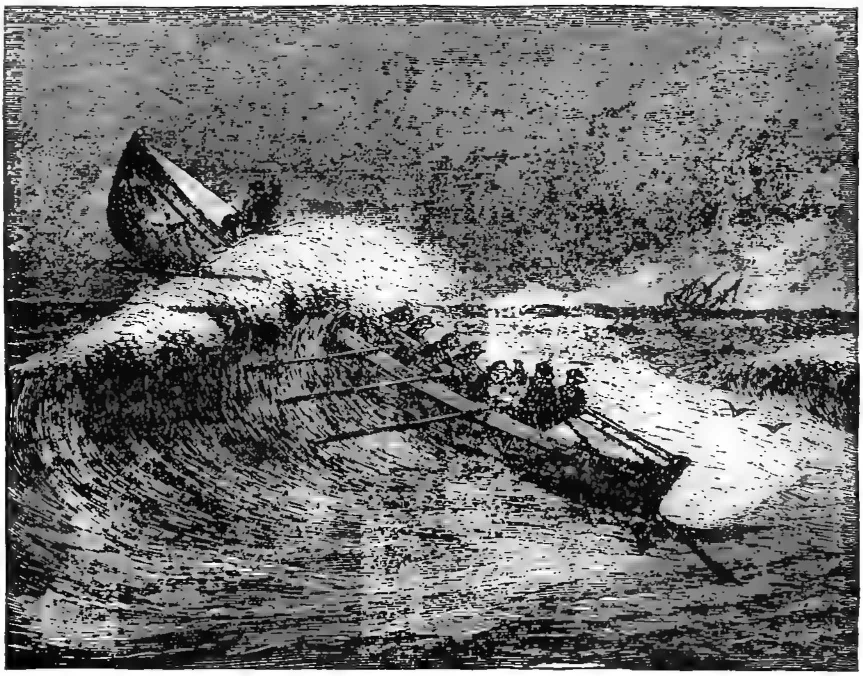


FIG. 2.—Self-righting and self-bailing English life-boat going out to a wreck in a heavy sea.

It will be readily understood that the life-saving effort of those years was greatly hampered by the existing conditions. The stations were built and furnished on the Long Island and New Jersey beaches, and the life-boats distributed at various points upon the coast, but no keepers were appointed or paid to take charge of them. They were left to the care of the people living on the coast, and to their uncertain good-will, heroism, and skill was intrusted the duty of using the appliances furnished in case of shipwreck. The result was that the stations and their appurtenances, as well as the life-boats scattered about the coasts, became dilapidated or were applied to private purposes; and that frequently, when wrecks occurred, no assistance could be given, as powder, mortar, cables, and the other equipments had been stolen. The loss of over 300 lives from the ship Powhatan, wrecked upon the New Jersey coast in 1854, at length again roused the attention of Congress to the general inefficiency, and an act was passed authorizing the renovation of the station equipments, the appointment of a superintendent for each of the two coasts of Long Island and New Jersey at a salary of $1500 per annum, a keeper for each station at a salary of $200 per annum, and a custodian for the respective life-boats. But little improvement resulted however. The superintendents and keepers, chosen by village politicians, were persons who had worked for their party but who often knew nothing of handling boats or of the perils of the sea, and who troubled themselves little about them after appointment as before. For seventeen years affairs remained in this condition. In 1869 a marked advance was made by the efforts of the Hon. S. S. Cox. An amendment to an appropriation bill, moved by the Hon. Charles Haight, of New Jersey, providing for the employment of crews of regular surfmen at the stations, had been defeated, when Mr. Cox with great energy succeeded in getting a substitute adopted which supplied them to alternate stations. Although this measure was not enough to render life-saving endeavor efficient, it created an improvement, and was of great importance in preparing the way for the subsequent manning of all the stations with crews.

The time had now come for a supreme effort. In the winter of 1870–71 several shipwrecks occurred, with great loss of life, which were evidently chargeable to the ill-condition of the boats and apparatus and to the remissness or incompetency of the employés. In February, 1871, Mr. Sumner I. Kimball took charge of the revenue marine service, to which the care of the few life-saving stations had always been allotted, and in view of these disasters made proper representations through the Department to Congress, which then appropriated $200,000 for the requirements of saving life from shipwreck on the coast, authorizing also the discretionary employment of crews at all the stations, though for only three months in the year. Mr. Kimball at once began operations by setting on foot a thorough investigation of the condition of the service. It was found that most of the stations were too far from each other and that the houses were much dilapidated, many being so far gone as to be worthless and the remainder in need of extensive repairs and enlargement. With but few exceptions they were in a filthy condition, and gave every evidence of neglect and misuse. The apparatus was rusty for want of care, and some of it ruined by the depredations of vermin and malicious persons. Many of the most necessary articles were wanting, and at no station was the outfit complete. At some of the stations, even where crews had been employed, such indispensable articles as powder, rockets, shot-lines, shovels, etc., were not to be found. At other stations not a portable article was left. Some of the keepers were too old for active service, others lived too far from their stations, and few of them were really competent for their positions. Politics had had more influence in their appointment than qualification for the duties required of them. Even in the selection of crews for the stations where they were employed, fitness was a secondary consideration. Upon this showing Mr. Kimball at once began the work of organizing the service. The old station-houses were repaired and enlarged; new ones were built so as to bring the stations within from 3 to 5 miles of each other. These houses were of simple but durable construction. They consisted of a large apartment, to contain life-boats, life-car, wagon, mortar, etc., and a kitchen and sleeping-rooms for the crew. Inefficient and unskilled keepers were discharged, and trained and courageous surfmen were appointed in their places. Each station was manned with a permanent crew of hardy, sober, skilled men who were organized, drilled, and regularly paid. The increased efficiency of the service consequent upon these measures is shown by the remarkable fact that 22 wrecks occurred that year on the New Jersey coast without the loss of a single life.

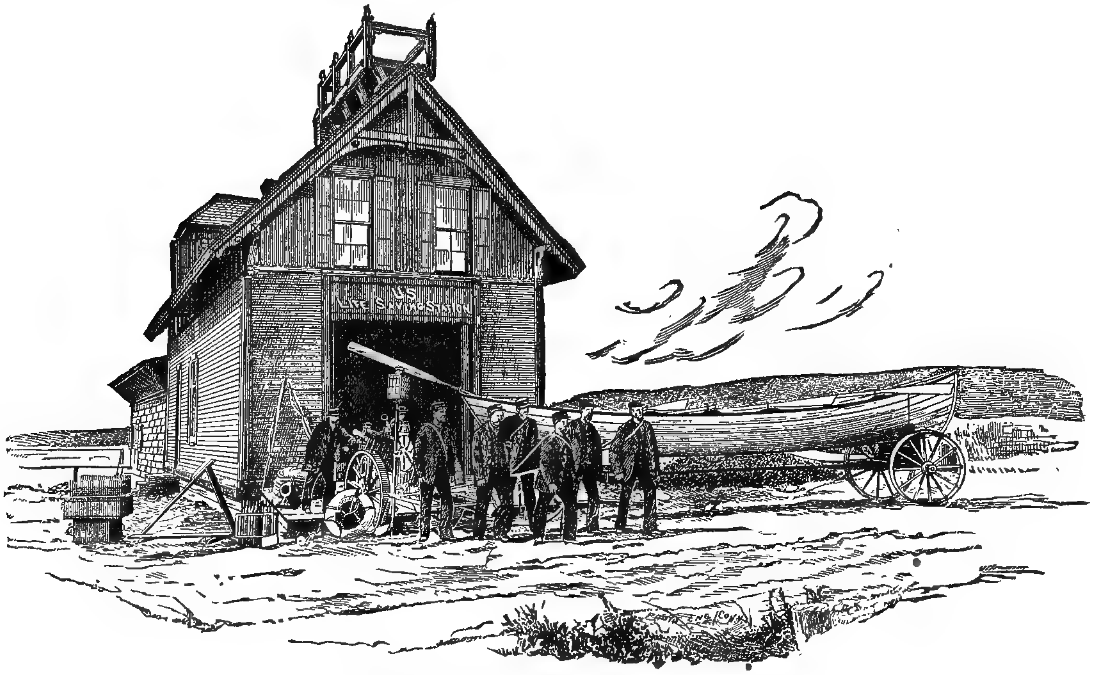


FIG. 3.—Life-saving Station at Seabright, N. J.

Crew hauling out hand-cart partly loaded with apparatus. Surf-boat on its wagon to the right. Hawser, Lyle gun, breeches buoy, box of cylindrical shot, faking-box, etc., to the left.

In 1872 an additional station was placed on the Rhode Island coast, and 9 stations were built on Cape Cod between Race and Monomoy Points. The entire service was now organized into three districts, the keepers and surfmen of each being under their several superintendents and all under the supervision of an inspector. Keepers and surfmen were also subjected to regular discipline and drill. Weekly reports were required from each keeper. The system of patrol was also established for the first time in any life-saving service, the surfmen being required to serve on watches as sentinels and to keep up night and day a patrol along the coast under their charge. Only one life was lost by shipwreck this year in the space guarded by the service.

In 1873 an appropriation of $100,000 was given by Congress for the extension of the line of stations to the coasts of New Hampshire, Maine, Virginia, and North Carolina, and 22 new stations were built on these coasts. A commission was authorized by Congress to thoroughly examine the entire sea- and lake-coasts of the United States, and to report upon the number of additional stations required and the points at which they should be placed. The commission consisted of Mr. S. I. Kimball and Capts. John Faunce and J. H. Merriman of the revenue marine service. After a detailed examination into the wrecks and casualties on the coast for the ten years preceding, it recommended the experimental grouping of the stations into three classes: (1) Complete life-saving stations, so called, destined for all solitary coasts with flat beaches, fully equipped, and provided with resident crews; (2) Life-boat stations, severally in charge of a keeper only, with volunteer crews—the populous character of the localities contemplated promising to render this form of aid available—these stations to be located at points where the immediate depth of water would enable the easy launch of the heavy, self-righting, and self-bailing English life-boat; (3) Provisioned houses of refuge, each in custody of a keeper and his family, for the eastern coast of Florida, where wrecks, owing to the nature of the coast, drive so near the shore that escape from them is comparatively easy, and the main danger to the mariner is of dying of hunger and thirst after reaching the desolate land. These recommendations were adopted by Congress in an act which also created five additional districts, each with its superintendent, provided for the bestowal of two classes of medals of honor, and empowered the collection and tabulation by the service of statistics of disaster to shipping. The arrangement of the stations into classes as described still continues, except that the life-boat stations have nearly all dispensed with the volunteer system in favor of regular crews, experience having shown the wisdom of maintaining a steady personnel for all occasions of service.

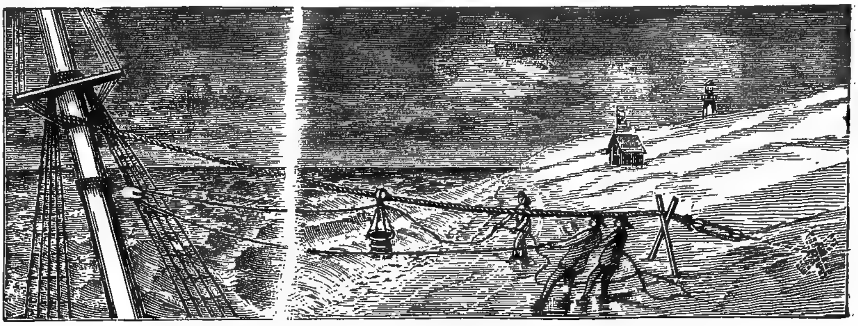


Fig. 5.—Breeches-buoy being hauled out to the wreck by life-saving crew.

In 1874–75 there were 22 stations added, and in 1875–76 6 were built on the Maryland and Virginia coasts; 35 were added during 1876–77, and in 1877–78 4 were built and nearly all the old ones repaired. In that year the service was formally reorganized by Congress and separated from the revenue marine, of which it had hitherto formed a part. Mr. Sumner I. Kimball was nominated general superintendent by the President and unanimously confirmed by the Senate. The annual term of service of the crews, which had heretofore been from December until March on the Atlantic coast, was extended from September to May, and on the lakes from the opening to the close of navigation; the compensation of the keepers was doubled, and provision made for the payment of the volunteer crews who manned the life-boats on the lakes. Thirty-seven new stations were also ordered to be built, and a new district was created on the Gulf coast.

Since that time the details of the steady expansion of the service, year by year, are best given in its annual reports. The number of stations is increasing, until the original plan of the general superintendent, which was once thought hopelessly impracticable, to surround all parts of the Atlantic and lake-coasts of the United States dangerous to navigation with a cordon of these posts of succor to imperilled seafarers, manned by skilled and disciplined surfmen, is almost fulfilled. In the scheme of the service the coast is divided into 12 districts. The whole is presided over by a general superintendent, aided by an assistant general superintendent, their head-quarters being in the treasury at Washington. There is an inspector of life-saving stations, and two superintendents of construction stationed at New York, who supervise all building and repairs and purchase equipments for new stations. An officer of the revenue marine acts as assistant inspector in each district, his function being to see that the stations are kept in proper condition and the crews well practised in the use of the life-saving apparatus. Each district has a superintendent, who manages its affairs under the general direction of the chief of the service and is responsible for its efficiency. The salaries of these officers range from $1500 to $1800 per annum. The stations are severally in the charge of a keeper, who is required to be an expert in boat-craft, the art of surfing, and all wreck operations. He is by law an inspector of customs, having power over all stranded property and against smugglers. Under his command is a crew of seven men, composed of the ablest surfmen that can be procured. Upon occasions of service at wrecks the keeper is charged with the dangerous and difficult post of steersman. The pay of the keeper is $700 per annum. The crew receive severally $50 per month. The duties of these men are mainly divided between their perilous service in effecting rescues on occasions of shipwreck and maintaining a nightly patrol of the beaches, on the lookout for endangered shipping. Apart from the work of rescue the latter is their severest, as it is their most constant task, the watch being held through all the hours of darkness, on desolate coasts and in all varieties of weather. This patrol is a peculiar feature of the American service, and has greatly contributed to its success, as it insures the prompt discovery of stranded or distressed vessels before the surf can have time to tear them to pieces. It is kept by dividing the station-men into four watches of two men each. These men leave the station at sunset, separate, and go to left and right until they meet the patrolmen of the adjacent stations, with whom they exchange metal checks, suitably inscribed, as a token that the duty has been performed, and then return to the station, when the second party sets out, and so on until the night is exhausted. Patrol is also maintained in the daytime, if the weather be thick or foggy.

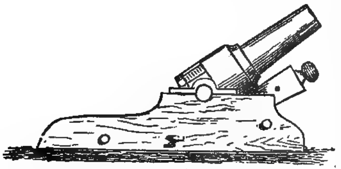


Fig. 4.—The Lyle Gun.

The stations are picturesque two-story houses, containing six or seven rooms, well stocked with all life-saving appliances, and also fitted for the residence of the crews. On the Atlantic beaches they are located at an average of 5 miles apart, and on other coasts at points where the frequency of wrecks indicates a need for their presence. Many of them are connected by telephone, and it is in contemplation to put them all into this communication as soon as it can be effected. Horses to lighten the labors of the men in the heavy hauling of apparatus incident to the work of rescue are provided at a number of them, and it is also designed to extend this facility to the entire chain. The cost of a life-saving station, fully equipped, is about $6000, and of a house of refuge $3000. (Fig. 3.)

The equipments for a complete station are as follows: (1) One light draught six-oared surf-boat with its carriage. It is built of cedar, with air-cases at the ends and cork fenders at the sides, which render it insubmergible. Its weight is from 700 to 1000 pounds. The great weight (4000 pounds or more) and draught of the English life-boat makes its use impossible on the flat sand beaches of the Atlantic coast with their shoaling waters (Fig. 2). American life-boats considerably lighter, the inventions of Capt. J. M. Richardson, superintendent of the First Life-Saving District, and Capt. D. P. Dobbins, superintendent of the Ninth District, are in use at several life-boat stations. At the others the English is still used. (2) A Lyle gun weighing 185 lbs. (Fig. 4). When every moment's time may cost many lives the weight of the apparatus which has to be dragged through the sand is a point of vital importance. The gun now in use is the

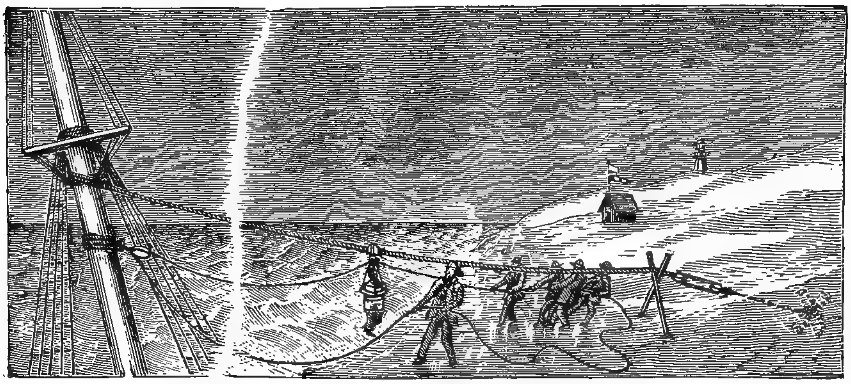


FIG. 6.—Breeches-buoy with man in it being hauled ashore from the wreck.

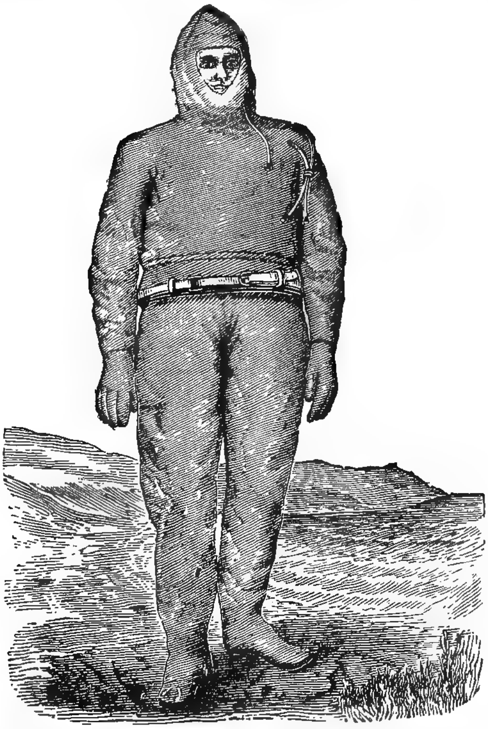


FIG. 7.—Surfman in Merriman life-saving dress.

invention of Capt. D. A. Lyle, U. S. army. It has an extreme range of 695 yards. The eprouvette mortar first in use weighed 288 lbs., and carried a shot only 421 yards. The Parrott gun next used weighed 266 lbs., and had a range of 473 yards. In addition to its superiority in respect to lightness the Lyle gun has the advantage of great strength, owing to the tenacity and ductility of the bronze of which it is composed. Its material also exempts it from corrosion, and its shot, which is cylindrical in form, and nearly the length of the bore, leaves it little windage. A shank spires from the end of the shot to the extremity of which the shot-line is tied, an expedient which prevents the line from being burned by the ignited gases when the discharge takes place. But the crowning merit of the gun is its simplicity, contrasted with rocket-apparatus and other devices used by foreign nations for carrying lines to wrecks. It is but to charge a small piece of portable ordnance with a cartridge, attach a line to the shot, pull a lanyard, and the result is accomplished. (3) Lines of various sizes, from the shot-line of linen thread, ⅛ inch thick, to the great hawser on which is to be slung the breeches-buoy or life-car. (4) Faking-boxes, of which each station has two or three. The faking-box is a contrivance for so arranging the shot-line as to facilitate its flight to a wreck. Its essential part is a frame, in the four sides of which wooden pins are set in vertical rows. Over these pins the shot-line is regularly rove, coil after coil and layer upon layer. The whole is then placed in the box, which is made fast. Upon an occasion of service abreast of a wreck the box is opened and the frame of pins withdrawn, so that the line remains as rove, in layers of fakes or loops, absolutely free at every point, and ready when attached by its end to the shot to fly to the wreck without friction or entanglement. (5) A life-car as previously described. (6) Breeches-buoys. The breeches-buoy is a circular ring of cork, from which depends a stout pair of canvas breeches, the whole arranged to be hung by an iron ring to the hawser like the car. Sitting in this one man at a time is swiftly drawn along the rope by means of the hauling-lines, until all are brought ashore. (7) Merriman life-saving suits, which are complete suits of India rubber, covering the entire body except the face. The suit is double above the waist, so as to be capable of inflation by rubber tubes appended to it. It is worn by the surfmen in rescuing persons struggling in the breakers. (8) Cork life-belts, which are worn by the crews while on boat service at wrecks. (9) Anchors, smaller boats, tools of various kinds, beds, bedding, a box of Coston lights, used in signalling wrecks; a medicine chest, containing medicaments for the use of those brought in from wrecks, and every other incidental appliance that experience has shown to be useful.

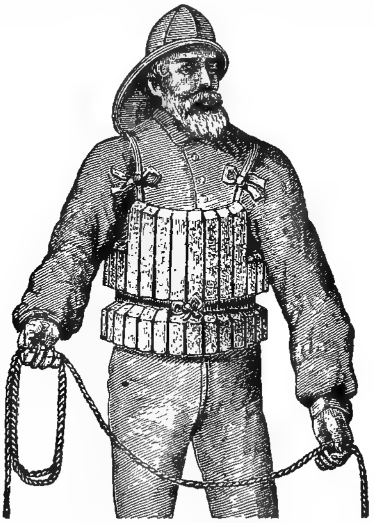


FIG. 8.—Surfman in his cork life-belt.

To draw all this apparatus to the scene of shipwreck a hand-cart is provided, the peculiarity of which is that it is very strongly built, and has large wheels with 5-inch tires to prevent them as much as possible from sinking into the sand. Recently, however, an apparatus-wagon has been introduced, which is much superior to the former appliance. It is the invention of Lieut. Charles H. McLellan, of the revenue marine, one of the inspectors of the service. The wagon has four wheels, and is in two sections, which are detachable. Upon it are kept arranged, in such method as renders it most serviceable, the entire apparatus necessary to establish line communication with wrecks. The hawser and hauling-lines find place on it upon reels, so that they can be paid off without attention, thus leaving a man free to attend to other operations. It has provision for 3 faking-boxes, which gives as many dry shot-lines for use if necessary. A signal pole is carried, which enables communication by signals with vessels stranded at a distance from the station signal pole. But its greatest advantage is its provision for the wreck ordnance. The gun is permanently mounted upon the rear section of the carriage, and this elevation adds 25 or 30 yards to its range, an increase of no mean importance. The arrangement also obviates the loss of time and occasional injury to the men caused by having to lift the gun to the ground and move it from place to place for firing. Facilities for securely fixing the elevation of the gun are also afforded by its being mounted as upon a regular gun-carriage. The boat is transported upon a carriage of its own.

The stations, their apparatus and stores, are by the regulations of the service, kept with the regard to order and precision of a man-of-war. Besides the appliances provided by the government almost every station is furnished with a box of books for the use of the surfmen when not on duty, the gift of generous individuals; and also with clothing for men and women, restoratives, additional bedding, and delicacies for the sick, sent by a private society of ladies known as the Woman's National Relief Association for the use of persons rescued from shipwreck.

A marked feature of the service is a very simple but effectual method of resuscitation practised upon persons apparently drowned. The station crews are regularly drilled in this method, as they also are in the use of the boats and apparatus, and in conversation by signals.

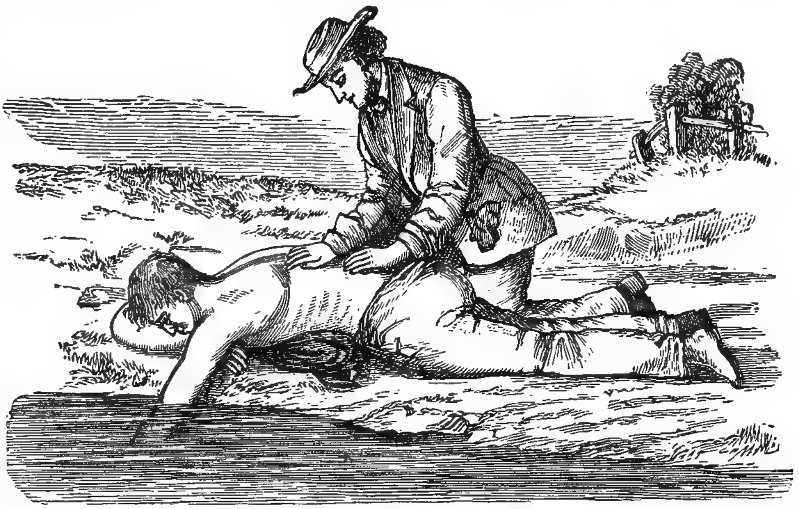


FIG. 9.—First stage of resuscitation process.

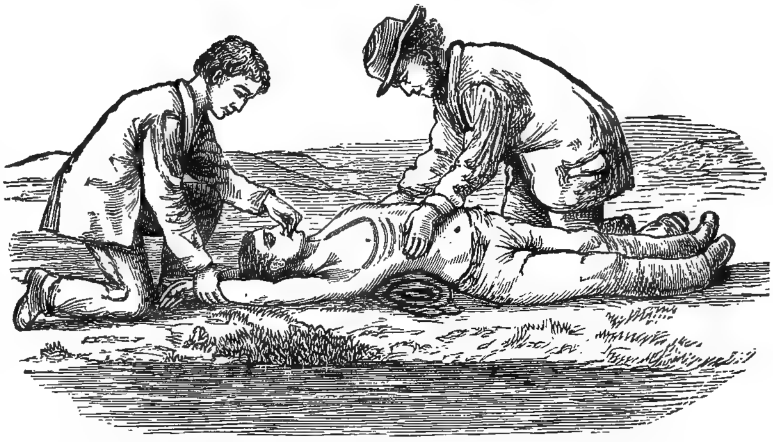


FIG. 10.—Second stage of resuscitation process.

The mode of service at wrecks is as follows: When a vessel drives ashore, if by day she is promptly seen by the station lookout; if by night the practised eye of the patrolman descries her struggling in the breakers, and he at once ignites his Coston light, the red flare of which notifies those on board that they are seen, an announcement which causes them to wait until assistance arrives. The patrolman then hurries to the station and brings the keeper and crew with their wagon-load of apparatus. In case the sea is at all within bounds the life- or surf-boat is always preferred, since, although the most dangerous, it is the quickest mode of procedure. Every reader of the story of wrecks and rescues has formed an idea of the masterly way in which the life-saving boat is manœuvred through the rabble of breakers, which perpetually rush and tumble in the effort to overthrow her; and how the sea-swept and dishevelled wreck is reached and her drenched company taken off one by one into the boat and conveyed safely to land. Should the sea be one in which a boat cannot live the method of rescue by means of wreck-ordnance is resorted to. A line attached to the end of the cylindrical shot which is used in the Lyle gun is fired across the wreck (Fig. 11). Hauling upon this line the people on board bring in a rope without ends, rove through a pulley-block, which is fastened by its tail to the mast. This hauling-line in turn brings on board a hawser, which is also fastened to the mast above the other. The shore end of the hawser is drawn over an upright crotch and secured in the sand by the sand-anchor. On this slender bridge of rope the life-car previously described is hung by its rings, so that it can be worked back and forth by means of the attendant hauling-lines between the wreck and the shore. The car is usually employed in case a large number of people are on board, when it is expedient to deliver as many as possible at a time. If a smaller number are in question, as on the majority of vessels, especially coasters, the contrivance

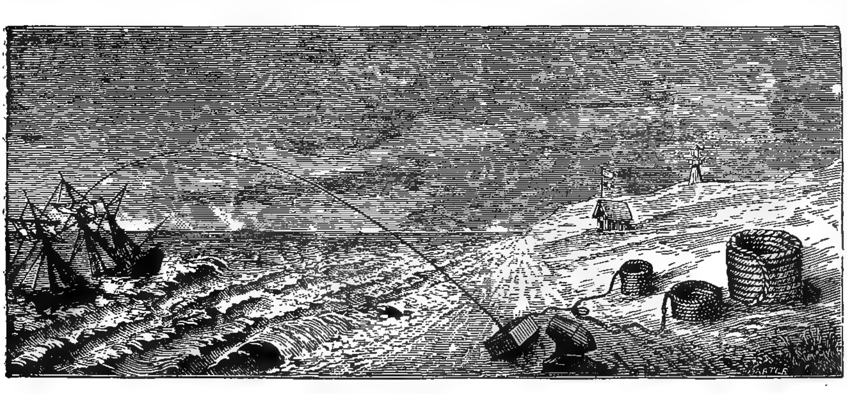


FIG. 11.—Shot-line flying to wreck from faking-box.

previously mentioned as the breeches-buoy is put into operation. Immediately upon being landed the rescued people are conveyed to the station and in every way cared for until able to do for themselves. The saving of property in connection with these wrecks is held by life-saving crews as secondary to the saving of life, and is only undertaken when their humane trust is discharged. (See Figs. 5 to 12.)

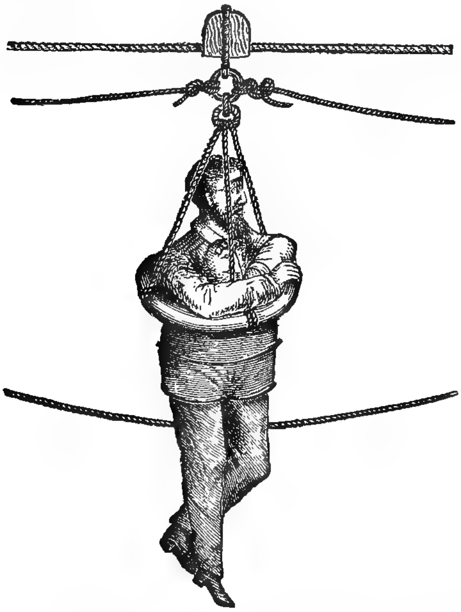


FIG. 12.—Man being hauled in breeches buoy.

The extraordinary efficacy which has attended the operations of this highly organized service since the introduction of the present system, Nov. 1, 1871, to June 30, 1885, is shown by the following summary :

Number of disasters	2,918
Value of vessels	$35,210,075
Value of cargoes	$16,553,619
Value of property involved	$51,763,694
Value of property saved	$36,277,929
Value of property lost	$15,485,765
Number of persons involved	25,693
Number of persons saved	25,236
Number of lives lost	457
Number of persons succored	4,829
Number of days' succor afforded	13,313

It is a notable feature in this service, and undoubtedly a main factor in its remarkable success, that it has always been, and of late years by the direct provision of law, entirely free from any connection with politics. Its keepers and crews are chosen for their posts solely on grounds of professional capacity and moral worth, and are retained so long as they remain efficient and without official fault. With the most experienced surfmen of the coast thus gathered into its ranks, to the exclusion of all extraneous considerations, the life-saving corps may well attain the great results aimed at.

The high purpose of this branch of the government, its admirable organization, and the perfection with which it has accomplished the work set before it, have commanded the admiration of foreign nations and made it a matter of justifiable pride to Americans. (R. H. D.)

A. Lyle gun.
B. Line ready to be fired.
CCC. Shot-line boxes.
DD. Whip-line.
E. Whip-line, block, and tally-board.
F. Rammer and Sponge.
G. Pin-frame and false bottom upon which shot-line is faked.
H. Breeches buoy.
I. Tackle.
J. Hawser.
K. Sand-anchor.
L. Tripod.
M. Flag-pole.
N. Ax.
OO. Drag-ropes.

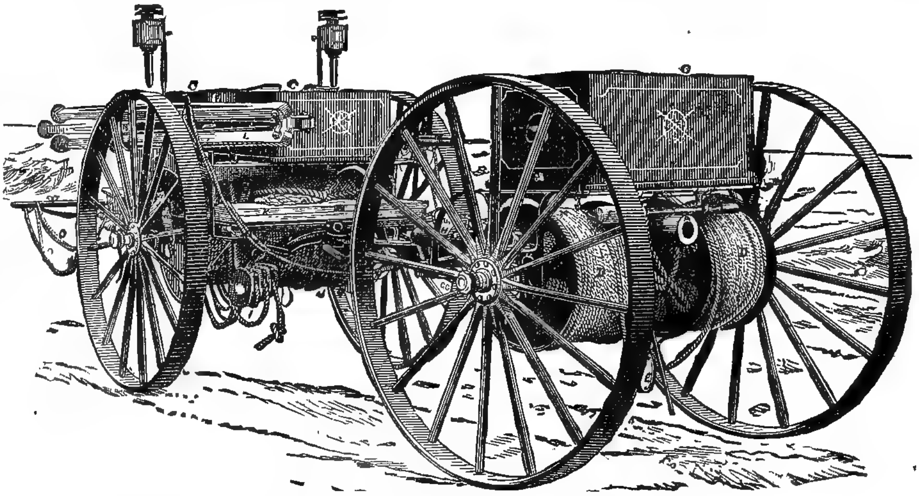


FIG. 13.—Full view of McLellan's life-saving apparatus wagon.

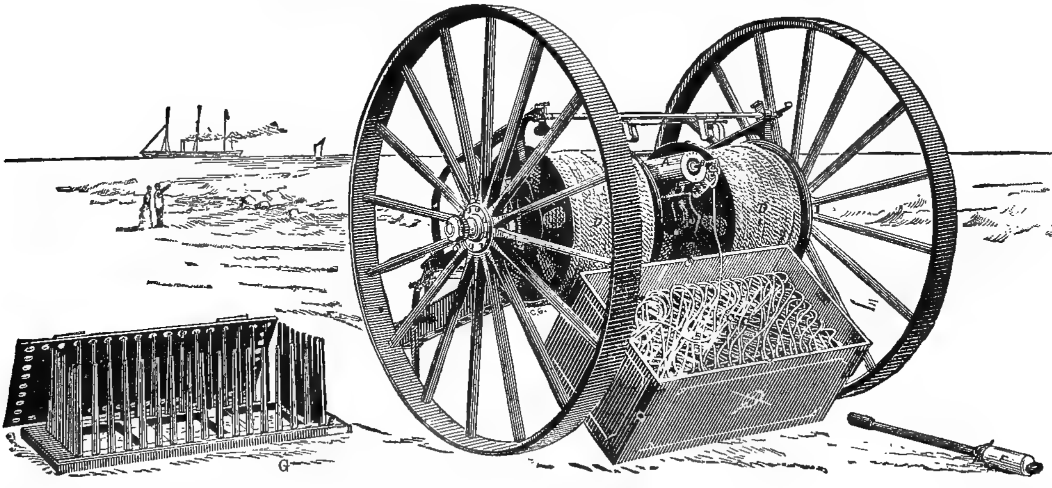


FIG. 14.—Rear section of McLellan's apparatus wagon,

LIGHTFOOT, Joseph Barber, an English clergyman, was born at Liverpool in 1828. He was educated at Trinity College, Cambridge, graduated in 1851, and took orders. He was tutor of Trinity College in 1857, select preacher in 1858, Hulsean professor of divinity in 1861, canon of St. Paul's, London, in 1871, and Margaret professor of divinity at Cambridge in 1875. In 1879 he was made bishop of Durham. He is a distinguished New Testament exegete, and was active in the revision of the English text, both alone and in the English company. He has also annotated *St. Clement's Epistles to the Corinthians* (1869).

LIGHT-HOUSE. By the act of Aug. 7, 1789, the United States accepted the then existing light-houses on the coasts and agreed to maintain them thereafter. They were then 8 in number and located as follows:

See Vol. XIV. p. 620 Am. ed. (p. 615 Edin. ed.).

Harbor Light, at Portsmouth, N. H.
Boston Light, on Little Brewster Island, Mass.
The Gurnet Light, near Plymouth, Mass.
Brant Point Light, on Nantucket, Mass.
Beaver Tail Light, on Conanicut Island, R. I.
Sandy Hook Light, New Jersey.
Cape Henlopen Light, Del.
Charleston Main Light, Morris Island, S. C.

Greatly improved lights are still maintained at these same localities. When the general government took charge of these lights they were placed under the direction of the secretary of the treasury. In 1792 the office of commissioner of the revenue was created and the lights were placed under his superintendency and control. When this office was abolished in 1802 the secretary of the treasury again took charge until 1813, when the re-establishment of the office of commissioner of the revenue caused the lights to again become part of the work of his office until it was once more abolished by act of Dec. 23, 1817, which became operative in 1820, when all its duties, including the lighting and buoyage of the sea-coasts and harbors of this country, were placed under the control and management of Mr. Stephen Pleasanton, the fifth auditor of the treasury. The lights in the meantime had increased from 8 to 55, and had been built and placed not according to any general plan but simply to satisfy local needs.

In the 32 years in which Mr. Pleasanton held this position the lights increased from 55 to 325 light-houses, 35 light-ships, and a number of buoys, monuments, and other aids to navigation. The duties became too great to be properly attended to by one man, many complaints were made as to the insufficiency of the service, and finally, after considerable discussion in Congress and much painstaking and earnest work on the part of Lieut. Thornton A. Jenkins and Richard Bache, U. S. Navy, who were sent abroad to collect information and to report as to the best method of reorganizing the light-house establishment, the act of Congress approved Aug. 31, 1852, called into existence the Light-house Board of the United States as it now exists.

This act requires the President to appoint two officers of the navy of high rank, two officers of the corps of engineers of the army, two civilians of high scientific attainments, whose services may be at the disposal of the President, together with an officer of the navy and an officer of engineers of the army as secretaries, who shall constitute the light-house board; the secretary of the treasury is *ex officio* president of the board, and the board is attached to his office and under his superintendence attends to all the administrative duties relating to the construction, care, and maintenance of all aids to navigation. This board meets by law on the first Mondays in March, June, September, and December. In addition to these regular meetings there are called meetings about once every two weeks. The board was required to arrange the Atlantic, Gulf, Pacific, and Lake coasts into light-house districts not exceeding 12 in number. To each district was assigned an officer of the army or navy as inspector, and the President was required to detail from the engineer corps of the army such officers as might be required to superintend the construction and renovation of light-houses. The board, subject to the approval of the secretary of the treasury, was required to prescribe and issue such regulations as they deemed proper to secure an efficient, uniform, and economical administration of the service. The board was to have prepared by their engineer, secretary, or by such officer of engineers of the army as might be detailed for that purpose, all plans, drawings, specifications, and estimates of cost of all illuminating and other apparatus, and of construction and repair of towers, buildings, etc., connected with the light-house establishment. The board was to furnish all the estimates of expense which the several branches of the light-house service may require, to be laid before Congress, and to submit to the secretary of the treasury an annual report of operations. Its members were forbidden to receive any pay for their services on account of being employed on the board.

The first board was thus constituted: Commodore W. B. Shubrick, U. S. Navy, chairman; Prof. Joseph Henry, of the Smithsonian Institution, secretary; Commander S. F. Dupont, U. S. Navy; Gen. Jas. G. Totten, U. S. Engineers; Col. Jas. Kearney, U. S. Topographical Engineers; Prof. A. D. Bache, Superintendent U. S. Coast Survey; Lieut. Thornton A. Jenkins, U. S. Navy, naval secretary; Capt. E. L. F. Hardcastle, U. S. Engineers, engineer secretary.

The board divides its duties among standing committees as follows: *The committee on finance*, which has charge of all matters relating to appropriations, to disbursing accounts, and to returns of property. *Committee on engineering*, which has charge of all matters relating to the construction, renovation, and repair of all fixed aids to navigation, and also to the preservation and improvement of sites. *Committee on floating aids to navigation*, having charge of all subjects relating to floating aids, including plans, models, estimates, and mode of construction. *Committee on lighting*, having charge of all matters relating to classifications, power, distribution, and character of illuminating apparatus, arc of illumination, and distinctive characteristics of lights. *Committee on experiments*, tests, where required, the value of oils and other illuminating materials and accessories, and of lighting apparatus; investigates the relative value of signals by sound or sight; the ventilation of light-houses and light-vessels and their protection from lightning; the modes of preventing corrosion or decay of materials used in the light-house service; and makes experiments or observations to determine the value, application, or economy in all other matters which the board from time to time may require. *Committee on location* has charge of all matters relative to the location of all aids to navigation.

The chairman of the board, unless otherwise ordered by the board, nominates the standing committees at the quarterly meetings. The chairman and the two secretaries are *ex officio* members of all standing committees.

The chairman and the two secretaries are the executive officers of the board, and the secretaries perform all the routine and administrative duties of the board, under the orders and regulations of the board or the chairman when he is present.

The naval secretary keeps the journal of the board's proceedings, and has charge of the office and its business, except so much as may be assigned to the engineer secretary. He also has charge of the floating aids to navigation, of supplies, of materials of illumination, of nominations of light-house and light-vessel keepers, and of the employés of the inspectors and of their salaries, of the supply and inspection of all aids to navigation after completion, and of other matters incidental to the above.

The engineer secretary has charge of all the fixed aids to navigation, of the preparation of plans and estimates for the same, of the preparation of all projects for the consideration of the committee on engineering, of the purchase and repair of illuminating apparatus, of the preparation of the annual estimates for special works, for repairs, and for fog signals, of the real estate of the light-house establishment, of the manufacturing establishments of the board at Staten Island—except that part relating to supplies—of the nominations and salaries of employés of light-house engineers, and of matters incidental to the above.

DISTRICTS.—The limits of the light-house districts are as follows:

First District.—From the north-east boundary of Maine, to include Hampton Harbor, N. H. Head-quarters at Portland, Me.

Second District.—From Hampton Harbor, N. H., to include Gooseberry Point, Mass. Head-quarters at Boston, Mass.

Third District.—From Gooseberry Point, Mass., to include Squan Inlet, N. J., and also Lake Champlain and the Hudson River. Head-quarters at Tompkinsville, Staten Island, N. Y.

Fourth District.—From Squan Inlet, N. J., to include Metomkin Inlet, Va., and also Delaware Bay and tributaries. Head-quarters at Philadelphia, Pa.

Fifth District.—From Metomkin Inlet, Va., to include New River Inlet, N. C., and also Chesapeake Bay and tributaries, and Albemarle and Pamlico Sounds. Head-quarters at Baltimore, Md.

Sixth District.—From New River Inlet, N. C., to include Cape Canaveral light-house, Fla. Head-quarters at Charleston, S. C.

Seventh District.—From Cape Canaveral light-house to the Perdido River, Fla. Head-quarters at Key West, Fla.

Eighth District.—From the Perdido River, Fla., to the Rio Grande, Texas. Head-quarters at New Orleans, La.

(There is no *Ninth District.*)

Tenth District.—From the mouth of Saint Regis River, to include Grassy Island light-house, Detroit River. Head-quarters at Buffalo, N. Y.

Eleventh District.—Includes all aids to navigation in the great lakes above Grassy Island light-house. Head-quarters at Detroit, Mich.

Twelfth District.—Co-extensive with the coast of California. Head-quarters at San Francisco, Cal.

Thirteenth District.—Includes all aids to navigation in Oregon and Washington Territory. Head-quarters at Portland, Oregon.

By act approved June 23, 1874, the board was required to divide the Mississippi, Ohio, and Missouri Rivers into one or two additional light-house districts, and to lease the necessary ground for lights and beacons to point out changeable channels. Accordingly the fourteenth and fifteenth districts were created. Their limits are as follows:

Fourteenth District.—Includes all aids to navigation on the Ohio River. Head-quarters at Cincinnati, O.

Fifteenth District.—Includes all aids to navigation on the Mississippi and Missouri Rivers. Head-quarters at St. Louis, Mo.

The following table shows the number of lights, beacons, buoys, etc., in existence on June 30, 1885, and also shows the large increase in the lighting of our coasts since the board was first organized:

Aids to navigation in the United States.	First district.	Second district.	Third district.	Fourth district.	Fifth district.	Sixth district.	Seventh district.	Eighth district.	Tenth district.	Eleventh district.	Twelfth district.	Thirteenth district.	Fourteenth district.	Fifteenth district.	Atlantic and Gulf coasts.	Pacific coast.	Lake coast.	Rivers.	Total for entire coast, 1885.	Total for entire coast, 1884.	Increase in the year.
Electric lights	......	......	1	......	......	......	......	......	......	......	......	......	......	......	1	......	......	......	1	......	1
First-order lights	2	4	6	5	6	5	9	2	......	......	7	5	......	......	39	12	......	......	51	51	0
Second-order lights	7	3	1	......	......	1	......	4	......	3	1	......	......	......	16	1	3	......	20	19	1
Third-order lights	5	1	5	3	......	4	4	4	5	16	3	1	......	......	26	4	21	......	51	49	2
Three-and-a-half-order lights	......	2	1	......	......	......	......	......	1	7	......	......	......	......	3	......	8	......	11	11	0
Fourth-order lights	19	22	33	9	30	8	5	13	21	48	9	7	......	......	139	16	69	......	224	222	2
Fifth-order lights	20	16	14	9	22	5	......	12	6	25	2	2	......	......	98	4	31	......	133	131	2
Sixth-order lights	1	6	33	3	14	7	1	3	21	37	......	......	......	......	68	......	58	......	126	123	3
Lens lanterns	......	......	......	1	14	......	......	10	......	4	......	24	......	......	25	24	4	......	53	51	2
Range lenses	......	......	6	8	2	1	......	......	......	......	......	......	......	......	17	......	......	......	17	16	1
River lights	......	1	56	......	3	63	......	7	9	......	......	......	438	623	130	......	9	1,061	1,200	1,117	83
Reflectors	......	8	......	8	2	16	......	......	4	......	......	......	......	......	34	......	4	......	38	34	4
Light-ships in position	......	8	5	4	......	3	......	2	......	......	......	......	......	......	22	......	......	......	22	23	—1
Lighted buoys	......	......	1	......	2	1	......	......	......	......	......	......	......	......	4	......	......	......	4	3	1
Total lighted aids	54	71	162	50	95	114	19	57	67	140	22	39	438	623	622	61	207	1,061	1,951	1,850	101
Fog-signals operated by steam or hot air	10	7	11	3	1	......	......	2	......	21	12	4	......	......	34	16	21	......	71	68	3
Fog-signals operated by clock-work	8	8	31	7	53	2	......	5	5	7	3	2	......	......	114	5	12	......	131	126	5
Day beacons	93	53	41	1	12	22	40	8	......	1	29	14	......	......	270	43	1	......	314	363	—49
Whistling-buoys	7	6	3	3	1	4	1	2	......	......	6	2	......	......	27	8	......	......	35	34	1
Bell-buoys	10	5	4	2	2	11	......	......	......	1	......	......	......	......	34	......	1	......	35	29	6
Other buoys	481	455	514	161	1,036	258	201	84	164	183	34	127	......	......	3,190	161	347	......	3,698	3,457	241
Total unlighted aids	609	534	604	177	1,105	297	242	101	169	213	84	149	......	......	3,669	233	382	......	4,284	4,077	207
Total number of aids	663	605	766	227	1,200	411	261	158	236	353	106	188	438	623	4,290	294	589	1,061	6,235	5,927	308

The one electric light mentioned in the table is situated at Hallett's Point, New York, and its purpose is to illuminate the difficult passage known as Hell Gate. The Hell Gate tower is a skeleton iron structure, square in plan, having a base of 55 feet and a height of 250 feet. At its top it carries 9 electric lights of approximately 6000 candle-power each. Between the legs of the tower are the buildings (not shown in the figure) containing the boilers, engines, and dynamos in duplicate, and the bedrooms of the light keepers. The keepers reach the top of the tower by means of an elevator worked by hand.

This light is sufficiently powerful to create an artificial moonlight, enabling the shores to be easily seen. See Figure 1.

Light-houses are graded in different orders, according to the sizes of the lenses, the first order being the most powerful. The Light-house Board have used various illuminants, such as sperm, lard, colza, and mineral-oils, and has finally decided that the latter is the best and cheapest. Its adoption required the change of all the existing lamps and the manufacture of others suited to burning mineral-oil. This has been gradually accomplished, and now mineral-oil is in general use, except for the first-order lights on the Pacific coast, where it will shortly be introduced. The consumption of mineral is about twice as great as that of lard-oil, but as the cost of the former is only about one-quarter that of the latter, the saving is considerable, and amounts to fully $30,000 a year, and in addition a more powerful light is obtained.

The following table shows the candle-power of the lamps used in the different orders:

First order	5 wicks	450 candle-power.
Second "	3 "	163 " "
Third "	2 "	78 " "
Fourth "	1 wick	32 " "
Fifth "	1 "	18 " "
Sixth "	1 flat wick	12.54 " "

In addition to mineral-oil compressed gas is used in the gas-lighted buoys according to the Pintsch system, and in the beacons in Currituck Sound, N. C., according to the Foster system, while gas made from gasoline is used in the Maumee ranges near Toledo, Ohio, and at the end of the St. Louis River pier-head, Lake Superior. These are small lights which are difficult to reach in bad weather, and the apparatus is so arranged that they will keep lighted without attention for several weeks.

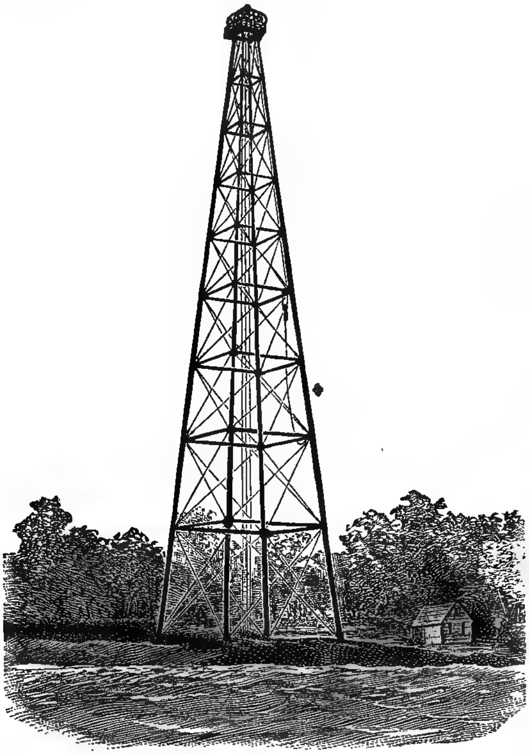


Fig. 1.—Electric Light-Beacon at Hallett's Point, L. I.

The numerous river-lights mentioned in the table are located on the banks of the Mississippi, Ohio, Missouri, Savannah, Cape Fear, and Hudson Rivers, and at the mouth of the Red River, La. This type of light (see Fig. 2) consists of a stake set in the ground, properly braced, and supporting a box at the top, in which is placed an ordinary kerosene lantern. These simple and inexpensive structures are so located as to point out the various channels. They are invaluable to river navigation, and owing to their portability can readily be shifted from place to place, to correspond to changes constantly occurring in the channels.

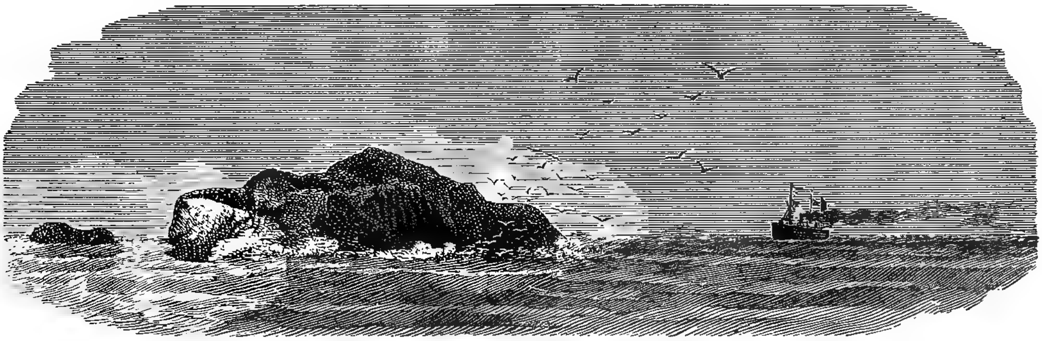


Fig. 6.—North-west Seal Rock, Cal.
Site of St. George's Reef Light-Station.

The relative merits of gas, oil, and electricity for light-house purposes have attracted great attention, and though *a priori* the electric light would seem to be the best, as it is so powerful, yet conclusive experiments were needed to show the fog-penetrating power of each kind of light; any one of the three kinds of lights being easily seen in clear weather as far as the curvature of the earth will allow; in other words, their luminous ranges are greater than their geographical ranges. A committee of the Trinity Board of England made a series of exhaustive experiments and a full report on this subject. Their summing up is as follows:

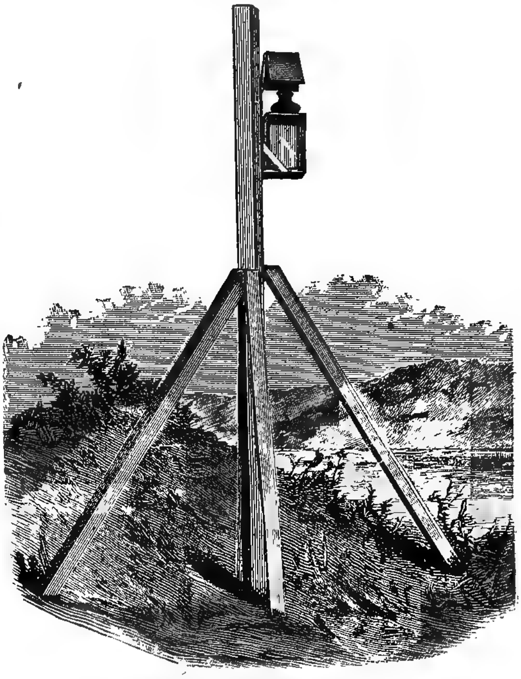


Fig. 2.—Stake Light on River Shore.

"That the electric has proved to be the most powerful light under all conditions of weather, and to have the greatest penetrative power in fog.

"That oil- and gas-lights, when shown through revolving lenses, are equal, light for light, in all conditions of weather. That when shown through fixed lenses the superposed gas-lights are superior to the oil; the larger diameter of the gas-flames, and the lights being much nearer to each other, give the beam a more compact and intense appearance than that issuing from the more widely separated oil-burners.

"That for the ordinary necessities of light-house illumination mineral-oil is the most suitable and economical illuminant, and that for salient headlands, important land-falls, and places where a very powerful light is required, electricity offers the greatest advantages."

The electric light referred to above is the arc light;

the Light-house Board is making experiments to determine the possibility of constructing an incandescent electric light suitable for light-house illumination. So far the success is not sufficient to warrant its substitution for the greatly more economical oil-light.

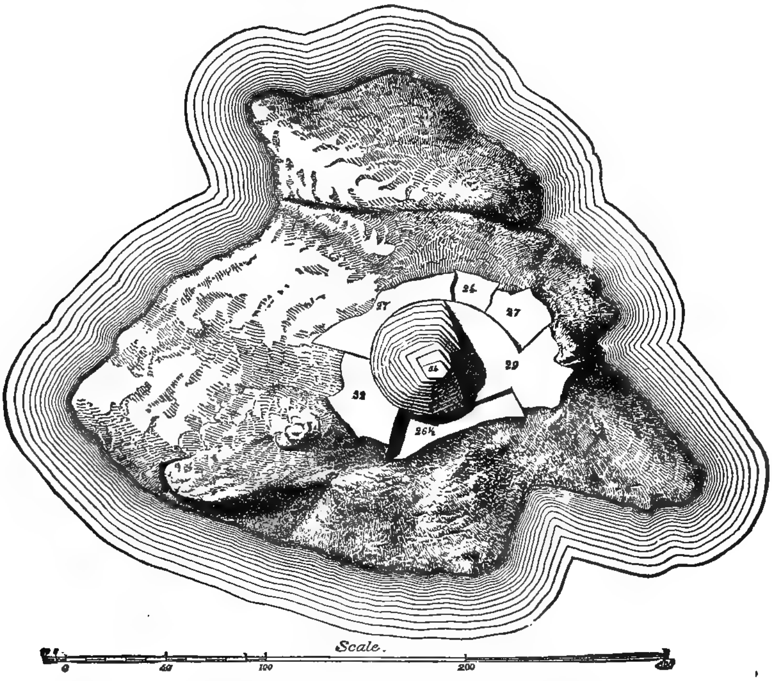


Fig. 7.—St. George's Reef Light-Station.

Plan of Rock as Prepared to Receive Masonry.

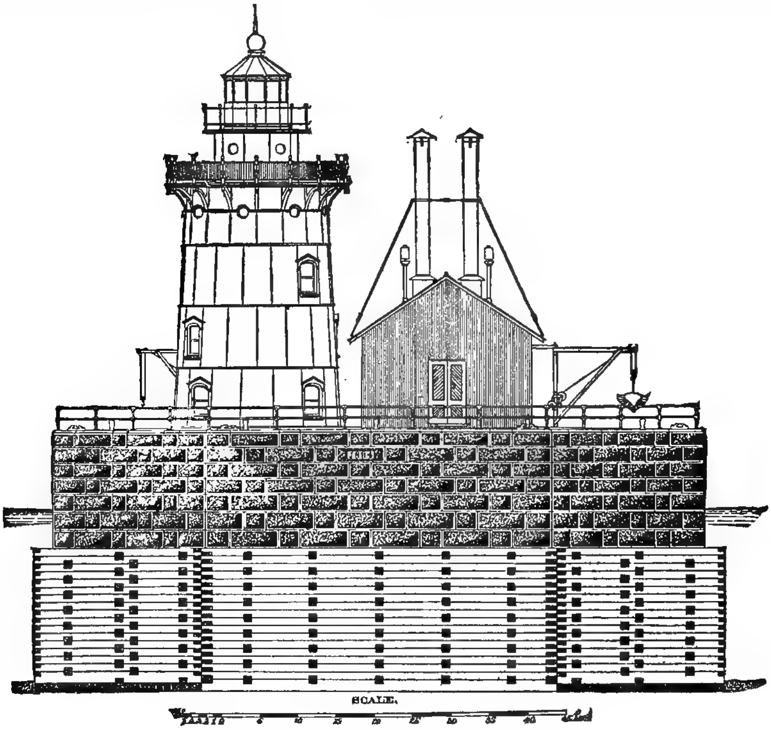


Fig. 8.—Detroit River Light-House.

Among the more important light-houses that have been built during recent years the following may be mentioned as presenting peculiar difficulties of construction successfully overcome: Tillamook Rock light-station is built on a basaltic rock (see Fig. 3) projecting out of the sea opposite Tillamook Head, Oregon. The difficulties here were the inaccessibility of the rock and its preparation for the sites of the structures. In the quietest seas it was fringed with foam, and the first

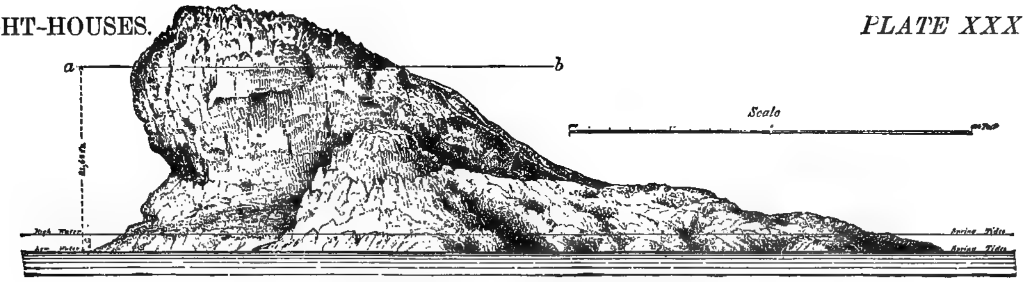


Fig. 3.—Original Appearance of Tillamook Rock, Oregon.

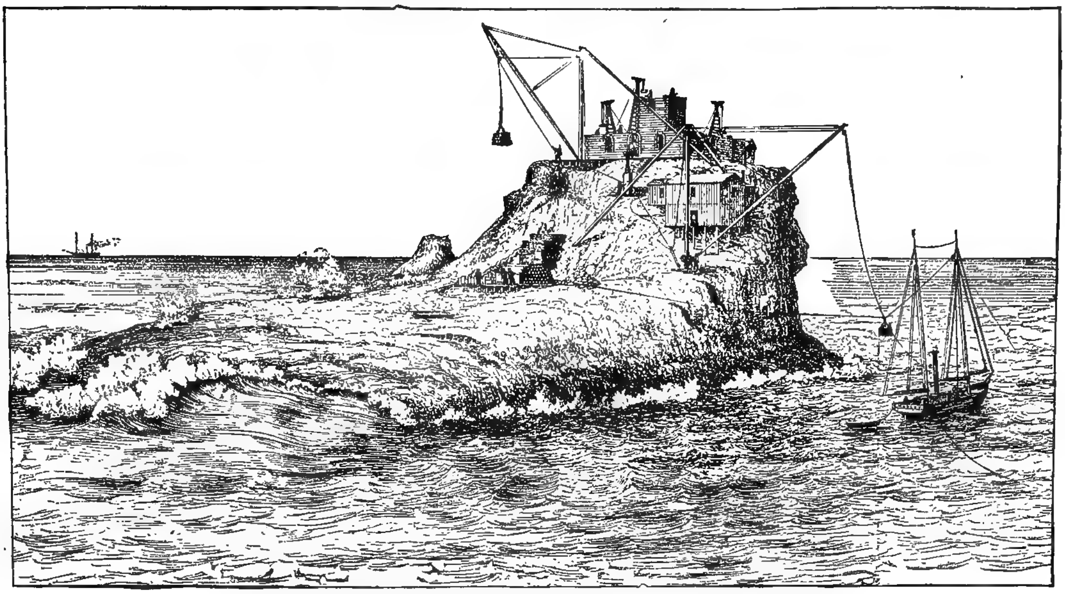


Fig. 4.—Tillamook Rock Light-house in Process of Construction.

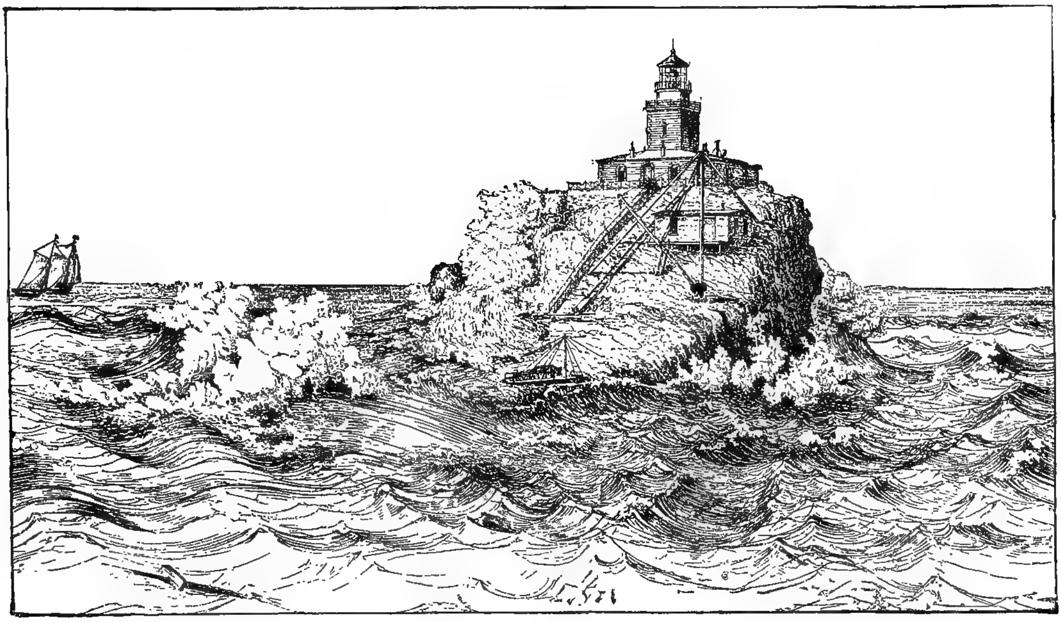


Fig. 5.—Tillamook Rock Light-house and Fog-signal Completed.

foreman of the work lost his life on the first attempt to land. With great labor, danger, and expense the rock was cut off level at the line *a b*, Fig. 3, and a first-order light and fog-signal established in 1880, as shown in Figs. 4 and 5. The total cost was $123,492.82.

North-west Seal Rock, the outer rock of St. George's Reef, opposite Crescent City, Cal., is a similar site, which has been selected for a light-house. In this case the difficulties are even greater than at Tillamook, as it is farther from a harbor, and the rock being lower and smaller is frequently entirely covered by the sea. On the other hand the experience gained at Tillamook has been invaluable, and so far there has been no loss of life, though there have been several narrow escapes. The rock is about 56 feet above the sea, and is shown in Fig. 6. The work has only progressed as far as the preparation of the rock for the masonry foundation. The manner in which the rock has been cut into steps is shown in Fig. 7. The masonry will consist of granite blocks, cut accurately to dimension on shore; in fact, all the work possible is to be done on shore, so that, when the actual building of the light-house is commenced, it may be carried to completion with as little delay as possible.

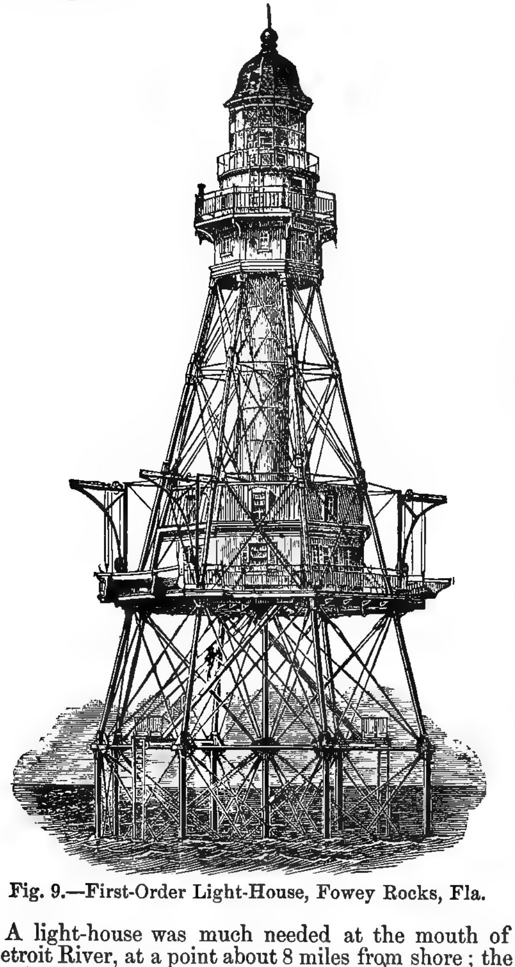


Fig. 9.—First-Order Light-House, Fowey Rocks, Fla.

A light-house was much needed at the mouth of Detroit River, at a point about 8 miles from shore; the depth of water was 22 feet, and the structure was exposed to floating ice. The foundation was to be large enough to accommodate a tower, fog-signal house, and the necessary boats. It consisted of a wooden caisson, with pointed ends, filled with concrete reaching to within 5 feet of the top of the water, and then surmounted by a cut stone-wall 11 feet above the water-level. The finished structure is shown in Fig. 8. It was completed and lighted Aug. 20, 1885.

A more difficult foundation was completed September, 1885, in the middle of Delaware Bay, on a shoal known as Fourteen-foot Bank. It consisted of an iron cylinder, 70 feet high and 35 feet in diameter, resting on a wooden working-chamber 10 feet high. The bottom of the working-chamber was carried 33 feet below the bottom of the shoal by the pneumatic process, and the cylinder was then filled with concrete, except near the top, where a space was left for the fog-signal apparatus. The superstructure, consisting of a tower and dwelling for the keepers, will be finished during 1886. In the meantime a temporary light is maintained on the foundation.

A very important first-order light was erected on Fowey Rocks, off the coast of Florida, in 1878. It is of the screw-pile type, and rests on a coral reef. Its general appearance is shown in Fig. 9.

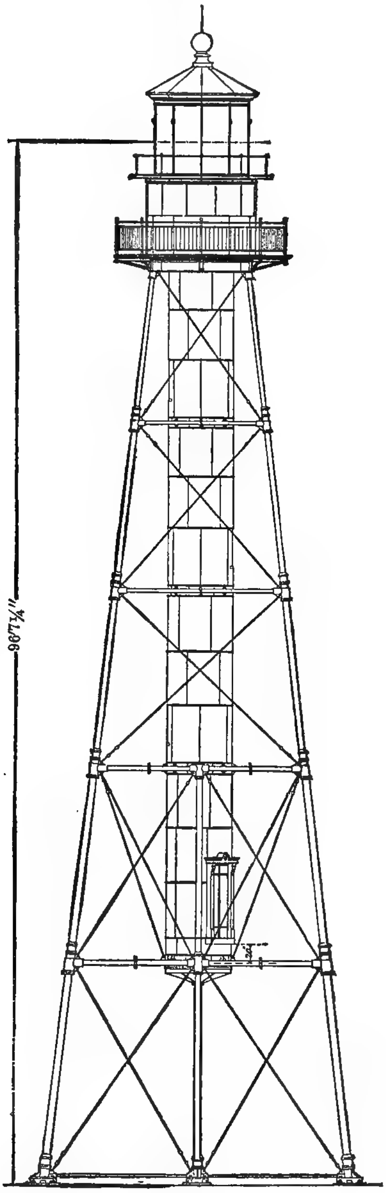


Fig. 10.—Light-House at Sanibel Island, Fla.

Lights have frequently to be located where the shore is liable to be abraded by the sea and their foundations endangered. In such cases it is advisable so to construct the light-house that it can be taken down if necessary, and rebuilt at a safer locality in the vicinity. The light-houses at Sanibel Island and Cape San Blas, Fla., are of this type, and one of a similar kind is to be built on Anclote Keys, Fla. As Sanibel Island is subject to overflow from hurricanes, the entrance to the tower is placed at some height above the ground. Fig. 10 shows the appearance of these structures.

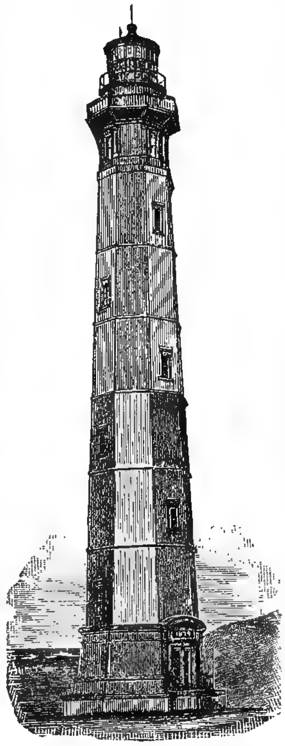


Fig. 11.—Cape Henry Light-house, Va.

In a great many cases it is necessary to locate light-houses where stone, brick, and other building material have to be brought from long distances at great expense. Iron, therefore, has been occasionally substituted, and owing to its low price of late years its use has become more frequent. Fig. 11 shows the first-order light at Cape Henry, Va., built entirely of iron. The height of this tower is 150 feet. It is a very striking-looking structure and the peculiar way in which it is painted makes it an excellent day-mark. The present light was finished in 1881. The original brick light-house, on a mound near by, was built in 1791. It is still standing, and serves well as an additional day-mark. (D. P. H.)

See Vol. XIV. p. 637 Am. ed. (p. 630 Edin. ed.).

LIGHTING, ELECTRIC. Although the electric light, which during the past ten years has made such remarkable progress in industrial application, has come to us almost with the force of an inspiration, yet there is nothing actually new in our knowledge of the principles involved. The only new feature in the case is in the economical application of these principles. It is the power of producing a strong current of electricity at moderate expense which has aroused inventors to simplify and perfect the old electric light apparatus, and render it available for public use. The electric light, as at present applied, depends on three facts that have long been known in electrical science. One of these is the fact that a current of electricity, when sent through an imperfect conductor, develops heat sufficient to raise thin metal to incandescence, and yield a brilliant glow. This is the basic fact in the incandescent lamp. A second is that a current through a broken conductor will leap over the intervening space with a bright spark, which, if the current be powerful, may become a continuous arc of light. To this fact the arc lamp is due. A third and highly important fact is that the armature of a magnet, when moved to or from the poles of the magnet, has an electric current developed in it which may be conveyed outward over conducting wires. This fact is the basis of the economical production of electricity. By its aid a powerful current can be obtained at a cost exceedingly more moderate than by the use of the galvanic battery. To it we owe the *dynamo*, the machine through whose operation the energy of a steam-engine is readily converted into electric energy, and secondarily into the electric light.

The arc light was first obtained by Sir Humphrey Davy in 1813. Experimenting with the great battery of the Royal Institution, a battery composed of 2000 zinc and copper couples, he found that when the light from the pile was passed between two pointed pieces of wood charcoal it grew so intense as almost to rival the sunlight in brilliancy. It also developed an intense heat. If the current was sustained, and the carbons kept at a regular distance apart, the light could be made continuous. It received the name of the arc because the updraught of air lifted the centre of the flame, so as to give it an arched shape. In the passage of the current the carbons rapidly wasted, particles being carried from each pole to the other, but twice as abundantly from the positive to the negative as the reverse. Thus there was actually an arch of matter in the intervening air, and the light was, in a partial sense, an incandescent one. The rapid wasting of the wood charcoal rendered this experiment useless as a source of continuous light. Thirty years afterwards Foucault suggested the use of gas carbon—the very hard and solid carbon which is deposited in the interior of gas retorts—as a substitute for the wood carbon. This proved far more durable and satisfactory. Yet gas carbon is rarely pure and uniform, and in the modern arc light a more homogeneous substance is employed. The gas carbon is ground up very finely, washed, mixed with a glutinous substance, moulded, and dried. Carbons thus made waste uniformly, and can be kept at a regular distance apart by the use of a clock-work *regulator* to move them forward as they waste away. The carbons must at first be brought close together to create the spark, and then separated sufficiently to produce an arc of suitable length. The regulator, as first devised by Foucault, is an essential feature of most of the arc lights in use. Various devices are employed to produce regularity of feed, the electric current itself being used as an automatic governing agent to increase or check the movement by its varying strength should the waste become irregular, and thus to keep the space between the carbons unchanged. The "electric candle," the device of Jablochkoff, is of value in that it dispenses with the regulator. In this the two sticks of carbon are placed side by side, and separated by an insulating material except at the point where the current passes. Thus they are always at the same distance apart. As the light descends through the waste of the carbons, the insulating substance yields to its heat, and wastes in accordance. To avoid irregularity through the inequality of waste of the positive and negative poles, the direction of the currents is changed at regular intervals, so that each carbon becomes successively positive and negative. A later development of this principle does away with the insulating material. It is found that the currents in the carbons repel each other, and form the arc only at the summit, so that no insulation is necessary.

Though the principle on which the incandescent light is based had been much earlier known, the first suggestion for its use as a light-giving agent seems to have been that of Prof. Jobard, of Brussels, in 1838. He suggested the idea that a small piece of carbon in an exhausted receiver would give an intense, steady, and continuous light. This is the idea embodied in the modern incandescent lamp, though its practical application has been attended with great difficulties. The first experiments with the incandescent light are attributed to an American, Mr. J. W. Starr, of Cincinnati, about 1840. After he died his idea was made use of by E. A. King, of London, who in 1845 patented a lamp in which a platinum wire was used as the light-giving agent. In 1849 Mr. Petrie, of England, produced a lamp in which iridium replaced platinum. Many subsequent experiments were made, M. de Changy being an active experimenter, but the first approach to success was made by M. Lodyguine, a Russian, in 1873. His lamp, which gained a grand prize from the St. Petersburg Academy, consisted of a stick of carbon in a glass receiver in which air was replaced by a non-combustible gas, such as nitrogen. Other inventions of the same general character were offered in 1875 and 1876, but they all failed from the nonpermanence of the carbons. By this time it seemed well demonstrated that only two substances could give satisfactory results—platinum, or an alloy of platinum, and iridium—in open air, and carbon in a vacuum or in a gas other than oxygen. Yet it was found that the light very rapidly increased with increase of temperature. Platinum or carbon brought to a red heat gave hardly any light. If brought to a white heat the light grew rapidly in intensity. Yet at very high temperatures platinum wastes rapidly. Carbon has, therefore, become the only available substance. And in the use of carbon no oxygen must be present, or it will quickly consume. The two experimenters who first achieved success in this difficult field were J. W. Swan, of England, and T. A. Edison (*q. v.*). Swan commenced his experiments in 1865. But the lack of a good vacuum and an economical current prevented success. He resumed in 1877. By that time the invention of the dynamo had solved the problem of the cheap current, while the discovery of the Sprengel air-pump rendered available a far more complete vacuum. His lamp was patented on Jan. 2, 1880. The experiments of Edison began with the arc lamp, but he soon turned to the problem of incandescence, experimenting at first with platinum. But as this substance proved a failure he began a long series of experiments with carbon filaments of different source, finally selecting a filament made of thin bamboo strips. This lamp was patented on Sept. 16, 1880. The Swan carbon was a specially prepared filament of cotton. These substances were charred and thus converted into carbon under proper conditions, and inserted in an arched form in highly exhausted glass bulbs, provided with platinum connections. The electric current being sent through this resisting carbon filament produces the intense and continuous glow of the incandescent light as now used. The efforts of these experimenters to achieve more perfect results have been sedulously continued, and subtended by those of numerous other persons, with the result of a very great increase in the duration of the carbons. These in all cases eventually break through lack of homogeneity or gradual waste. Yet some of the Edison and Swan lamps that were guaranteed for 1000 hours have lasted nearly 7500 hours, and at the present rate of improvement an average service of 2000 hours may be expected in the near future. The final form of the incandescent light is probably attained. Future improvement must be in the use of light-giving substances that will be able to bear higher temperatures safely.

The third essential of the electric light, the current-producer, has made equal progress. The costliness of the galvanic battery rendered it necessary to turn to magneto-electricity as a source of the current. In moving the armature before the poles of a magnet a degree of power must be exerted, and the resulting current of electricity is a direct resultant of this power or energy. As more powerful magnets are used, and the armature is moved with greater rapidity, the power requisite to move it rapidly increases. The strength of the current produced increases proportionately. In large machines of this character, human power is insufficient, and higher sources of power are requisite. The steam-engine has come into use for this purpose. The apparatus thus produced constitutes the dynamo. We cannot here go into the details of its construction. It consists essentially of the rapid movement of an armature before the poles of a powerful magnet, or battery of magnets, by the aid of steam-power, a series of rapidly alternating electric currents being thus produced. In most machines this alternation in direction is overcome by a commutator, and the current given to the conducting wires in a single direction. A very considerable variety of dynamo-machines have been invented, and the strength of current obtainable from a fixed exertion of power has been considerably increased over that of the earlier machines. In all, however, the principle is the same. The only difference is in the mode of its application. In America the principal arc systems in use are the Brush, the Weston, and the Thompson-Houston. Of incandescent systems the Edison and the Weston are the principal ones used. In these systems the most important recent improvement in the dynamos is in expedients to avoid undue heating of the armatures. By this means a considerable increase of power has been attained. The use of the Thompson-Houston system is mainly or entirely confined to this country. In this the armature is spherical, and is almost entirely enclosed by field-magnets. It has an automatic governor which keeps the current always steady, however the number of lights in the circuit may vary. Other systems in use in America are the Hochhausen, which is doing a large business, the Van de Poel, Western Electric, Fuller, Sperry, etc. The Brush lights are widely distributed, there being scarcely a large town without them. Probably 25,000 Brush lights are now employed. The price paid in New York is 70 cts. per lamp per night. In Philadelphia it is about 80 cts. In Montreal the cost of the Thompson-Houston light from dark to midnight is 50 cts. per lamp. The use of the arc lights is very rapidly extending, much more so than in England. It is estimated that 90,000 arc lights are now in use in the United States, and the number is being daily increased. They are usually placed at a moderate height, but in Cleveland the experiment has been tried of elevating them on tall iron masts, 250 feet high. There are four of these masts, each with eight Brush lamps. The effect, however, is poor, being equal to very pale moonlight in the streets.

The incandescent light has not flourished to the extent of the arc light in the United States, and has not been introduced into private houses as much as in England. Yet there are several central stations for its distribution, which is not the case in England. House-lighting here is mainly done by the Edison company. This company has a large central station in New York, supplying a district of one-quarter of a square mile in area, containing 55 blocks of buildings. Other stations are being introduced. It is estimated that there are 250,000 incandescent lights in the United States. There are two central stations in New York on the Weston principle of arc and glow lamps. The practical employment of the electric light has, in fact, been completely solved. It cannot, as yet, compete in price with gas, but is in other respects so superior that economy has become a secondary question. As to its influence on public morality and safety we may quote from the chief of police of New York to the effect that "every electric light erected means a policeman removed." The total electric plant in the United States is valued at $70,000,000.

The electric light has by no means been confined to street- and house-lighting, but has been introduced extensively into large stores and warehouses, railroad depots, etc., where it is of invaluable utility. It is being generally introduced on large steamers, both river and ocean. In light-houses it is gradually making its way, its superior intensity and penetrative power making it advantageous. In railroad cars its use is yet but moderate. The electric storage batteries, upon which such hopes of efficiency were recently based, have lost their reputation, and cannot be safely depended upon as a source of the electric current. Yet in combination with a current produced by the locomotive engine, they have in some cases proved useful. Another highly useful application of the electric light is to mining purposes. It has been introduced to a considerable extent to light up the galleries of mines, but as an aid to the miner himself it is yet lacking. His frequent change of place and the danger of the lamp being broken by an explosion are serious difficulties in the way of its use by the miner. Inventors are earnestly seeking to overcome these difficulties. Still another useful application of the electric light is its employment in photography. By its aid the former absolute dependence in this art on sunlight has been removed, and pictures may be taken or printed from negatives at any hour of the day or night. One final value of the incandescent light, as introduced into private houses, may be mentioned—its healthfulness. It does not heat nor vitiate the air like gas and oil. There is no smoke, no formation of unhealthful gases, no consumption of oxygen, and in it we have the only light in use that does not to some extent poison the atmosphere. (C. M.)

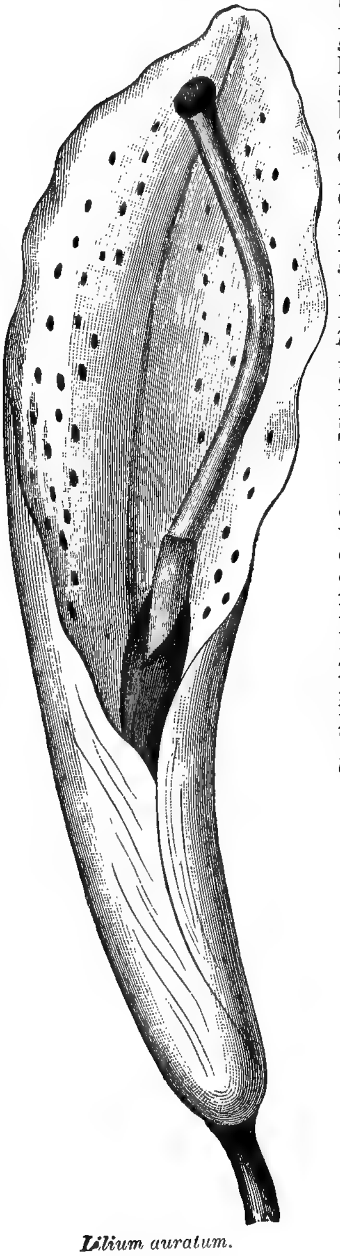
LIGNITE. See COAL.

See Vol. XIV. p. 649 Am. ed. (p. 643 Edin. ed.).

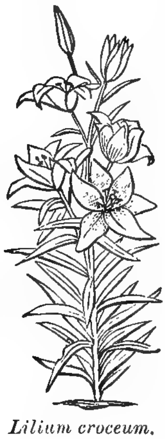
LILY. The lily, like the rose, is mentioned by Homer, and is among the oldest of cultivated flowers. There is a tendency to give this name to any flower highly prized. Hence we have the common Bind-weed of English fields, *Convolvulus arvensis*, called lily by the English peasantry; the Blackberry lily of China, *Pardanthus chinensis;* the Brisbane lily, *Eurynum australasicum;* the Cuban lily, *Scilla peruviana;* the Lily flax of New Zealand, *Phormium tenax;* Guernsey lily, *Nerine sarmientis;* Lent lily, *Narcissus;* Mexican lily, *Hippeostrumreginæ;* African lily, *Agapanthus umbellatus;* Persian lily, *Fritillaria persica;* St. Bruno's lily, *Anthericum liliastrum;* Trumpet, Nile, Easter lily, or Calla lily, *Richardia æthiopica;* besides pond or water lilies, and lilies of the valley; and even the lily of the field of the Scriptures is believed to have been the *Anemone coronaria*. The lily of the Canticles is believed to refer to the true white lily, *Lilium candidum*. The lily of Homer, Theophrastus, and others, is believed to be the *Lilium martagon* or old Turk's cap lily. The orange lily is frequently credited to the *Lilium croceum*, but the orange lily in common cultivation in England and Ireland in the days of William of Orange was *Lilium bulbiferum*. There are a number of gaudy orange-colored species, and one might almost believe that Longfellow's

> "Gorgeous flowerets in the sunlight shining,
> Blossoms flaunting in the eye of day,"

applied to them. In American gardens the lily succeeds well only in northern locations, or in mountain districts or high elevations. When found naturally in low lands it is in marsh situations, and the bulbs are deep in the ground where the soil is damp and cool. Thousands of bulbs of the gold-banded lily, *L. auratum*, are imported from Japan every year, but usually dwindle away, as it is believed, from the soil of our gardens being generally too dry for them. In order to keep them moist and plump for the journey the Japanese generally envelop each bulb in a composition of clay and cow-dung. A number of species are native to Japan, and the florists of that country have numerous varieties that are also an extensive article of trade with us. Some of these are curious monstrosities: one of them has but a single petal folding the gynœcium in the same manner that the spathe surrounds the spadix in the Calla lily. This is known as *Lilium auratum spathaceum*. *Lilium longiflorum* is a Japan species, very popular for winter-forcing with American florists, especially the variety *floribundum*, or, as it is known in the trade, the Harris lily, from its first introducer. This form is said to have been naturalized in Bermuda, and is sometimes called Bermuda lily. The florists pick out the stamens before the anthers burst, to keep the pollen from staining the pure white of the flower. American lilies have not been fortunate in getting any literary associations, but one species, *L. philadelphicum*, was dedicated by the monks when they constructed their sacred floral calendar to St. Praxedes, because it bloomed near Paris on that saint's day, July 21. Few lilies have fragrance. This character is chiefly possessed by *L. candidum* of Europe, *L. longiflorum* of China and Japan, and *L. washingtonianum* of California. These are all white, the Washington lily turning purple after opening. Botanists are often puzzled to distinguish one species of lily from another by the flowers and foliage; but the scaly roots differ very much from each other. The scales are often articulated, and florists propagate the kinds by separating and planting the scales. Lilies are remarkable for the tenacity with which the female character perpetuates itself. Dissimilar species crossed will show not the slightest trace of the male parent's characteristics in the progeny, and yet, left to themselves, they vary remarkably. In localities where the wild yellow lily (*Lilium canadense*) or the American Turk's Cap lily (*L. superbum*) abound, innumerable varieties may be selected. The wild orange red is *Lilium philadelphicum*, and the Southern red, *Lilium catesbæi*. One of the rarest of American plants is *Lilium grayi*, of the mountains of North Carolina. Hardly ten specimens have hitherto been collected, the first one being by Prof. Asa Gray. (T. M.)



Lilium auratum.



Lilium croceum.

See Vol. XIV. p. 653 Am. ed. (p. 647 Edin. ed.).

LIME, a highly important industrial product of the vast beds of carbonate of lime which exist everywhere as constituents of the rock surface of the earth. This material is found under the several forms of marble, chalk, and limestone, the latter the main source of commercial lime. Lime also occurs in the rocks as phosphate, and abundantly as sulphate, the latter having been already treated under its common names of gypsum and alabaster. Commercial lime, or quicklime, is an oxide of calcium. It is produced by heating the limestone in kilns, which drives out the carbonic acid, leaving the oxide as an amorphous white solid, infusible and non-volatile. As to the ordinary uses of this material they are too well known to need description. In agriculture it is used as a fertilizer. In architecture it is invaluable in the making of mortar, the substance by which bricks and stones are held together, and also as a plaster or cement, by which both internal and external walls are made smooth and uniform. Among its less well-known uses is that of a flux in the smelting of iron- and lead-ores. In 1884 the iron-furnaces consumed 3,401,930 long tons of this material, worth $1,700,965. The quantity used in lead-smelting is not known, but was, of course, very much less. The silicious character of all American iron ores requires the use of twice as much limestone per ton of fuel as is needed in foreign furnaces. Another important use of lime is as an ingredient in glass-making. Its designed use in this industry is quite recent, yet lime exists in all glass, ancient or modern, as an impurity of soda or potash, except in lead-flint. To its presence we owe the preservation of many beautiful specimens of ancient glass. All glass is somewhat soluble, soda-glass particularly so. Lime decreases this solubility, and is thus preservative. Glass rich in lime requires a higher temperature to melt, and is more destructive to pots. Yet it possesses valuable properties. It is less brilliant than lead-glass, but is harder, less easily scratched, holds its polish longer, is tougher, stands a higher temperature, better resists the action of water and chemical agents, and is much cheaper. Both caustic lime and limestone are used in this industry, the United States glass-works consuming about 3500 tons of the latter and 900,000 to 1,000,000 bushels of the former.

Limestone occurs everywhere throughout the United States. There is hardly a county in any State or Territory without one or more lime-kilns, though the importance of the industry varies greatly in different parts of the country. The products for the years 1882, 1883, and 1884, were respectively 31,000,000, 32,000,000, and 37,000,000 barrels, of 200 lbs. each. The price per barrel has fallen from 70 cts. in 1882 to 60 cts. in 1883, and 50 cts. in 1884, so that the value of the increased product of the latter year fell below that of the former years. The increase in 1884 was due mainly to the opening of new sources of supply, especially along the Mississippi and Missouri Rivers, and in Texas. The fall in price was due to strong competition, and to some cheapening in processes. The product of 37,000,000 barrels signifies the burning of 6,600,000 short tons of limestone. (C. M.)

LINCOLN, a city of Illinois, county-seat of Logan county, near the centre of the State, 28 miles N. N. E. of Springfield. It is at the crossing of 3 lines of railway. It has a court-house, a State institution for feeble-minded children, 3 hotels, 2 national banks, a private bank, 4 weekly and 1 daily newspaper, a high-school, 10 churches, a telephone line, 3 steam-flour-mills, manufactories of castings, agricultural implements, and other goods, 2 coal-mines, several grain-elevators, gas-works, etc. It is the seat of Lincoln University, under the control of the Cumberland Presbyterians. This institution was founded in 1865. The assessed valuation is $1,250,000 (or about one-fourth the full value); public debt, $67,000. The city was incorporated in 1865. Population in 1880 was 5639.

LINCOLN, the capital of Nebraska and county-seat of Lancaster county, stands on Salt Creek, 66 miles S. W. of Omaha, 40° 50′ N. lat., 96° 45′ W. long. It is at the junction of 8 lines of railway. The surrounding country is gently undulating and very fertile. Among the principal buildings and institutions are the post-office and U. S. court-house, the State university, the State capitol, the State prison, and the Nebraska insane asylum. The city has 19 hotels, 4 national banks, a private bank, 10 weekly and 4 daily papers, 5 street railways, 20 churches, a business college, 3 flouring-mills, planing-mills, 5 foundries, a large wholesale trade, and manufactures of furniture, builders' mill-work, leather, bricks, and tiles. There are extensive salt-works, using natural brines from springs and a basin near the town. It is a handsome city, well lighted with gas and electricity, and has a park and public water supply. The total valuation is $26,500,000; the public debt, $240,000. Lincoln was settled in 1867, and incorporated as a city in 1869. The population in 1880 was 13,003. Lincoln was named in honor of ABRAHAM LINCOLN (for whom see ENCYCLOPÆDIA BRITANNICA).

LINCOLN, BENJAMIN (1733–1810), an American general, was born at Hingham, Mass., Jan. 24, 1733. He was several times elected to the legislature and to the provincial congress of Massachusetts. Being also a colonel of militia he was active in organizing the State troops at the outbreak of the Revolution, and in the siege of Boston. He was appointed major-general in 1776, and commanded the expedition which in June cleared Boston harbor of British vessels. Having reinforced Washington after the defeat on Long Island, and in 1777 brought a new levy of militia to Morristown, N. J., he was at Washington's request appointed a major-general in the Continental service. In the summer with fresh troops from New England he served with Schuyler against Burgoyne, and afterwards was second in command to Gates. At Bemis' Heights, while reconnoitring, he was wounded, Oct. 8, and was disabled until August, 1778. Being then placed in command of the army in the South, he arrived at Charleston, Dec. 4. He protected this city from Gen. Prevost, who had already taken Savannah, and upon the arrival of Count d'Estaing endeavored unsuccessfully to retake the latter. In 1780 he was besieged at Charleston by Sir Henry Clinton, and after a brave defence capitulated on May 12. In November he returned to Hingham on parole, and being exchanged in the spring of 1781 joined Washington on the Hudson. He was at the siege of Yorktown, and was deputed by Washington to receive the sword of Cornwallis. He was secretary of war, 1781–84. After suppressing Shay's rebellion in 1787 he was elected lieutenant-governor, and in 1789 was made collector of the port of Boston. He was a commissioner to the Creek Indians in 1789, and to the Ohio Indians in 1793. In 1808 he retired from public life, and he died at Hingham May 9, 1810. (See his *Life* by Francis Bowen, in Sparks' *American Biography.*)

LINCOLN, LEVI (1749–1820), an American statesman, was born at Hingham, Mass., May 15, 1749. He graduated at Harvard College in 1772, studied law, and was judge of probate in 1776. Zealous in the cause of independence, he wrote many patriotic appeals. In 1780 he was a member of the State Constitutional Convention, of the State legislature in 1796, and of the State senate in 1797. He was elected to Congress in 1799, and opposed Adams' administration. He was U. S. attorney-general from 1801 to 1805, then was a member of the State council. In 1807 he was elected lieutenant-governor, and became acting governor in 1809. He was an original member of the American Academy of Sciences, and was long at the head of the Massachusetts bar. He died at Worcester, Mass., April 14, 1820.

LINCOLN, LEVI (1782–1868), an American statesman, son of the preceding, was born at Worcester, Mass., Oct. 25, 1782. He graduated at Harvard College in 1802, and was admitted to the bar at Worcester in 1805. He became prominent in his profession, and was a State Senator in 1812. He was a member of the lower House from 1816 to 1823, then lieutenant-governor, and in 1824 judge of the Supreme Court. In 1825 he was elected governor of Massachusetts, and held that office until 1834, being the first to exercise the veto power. He was elected to Congress in 1835, and in 1841 was made collector of the port of Boston. In 1844 he returned to the State senate, and in 1848 he was the first mayor of Worcester. He was a member of many historical and scientific societies. He died at Worcester, May 29, 1868.

His brother, Enoch Lincoln (1788–1829), was born at Worcester, Mass., Dec. 28, 1788. He was admitted to the bar in 1811, and settled in Maine. From 1818 to 1826 he was a member of Congress, and from 1827 to 1829 governor of Maine. He died at Augusta, Me., Oct. 8, 1829. Some of his manuscripts were published in the *Maine Historical Collections.*

Another brother, William Lincoln (1801–1843), was noted as an antiquarian, and published a *History of Worcester* (1837).

LINCRUSTA WALTON, the name given to a newly devised decorative material, of considerable interest and importance. It is the invention of Mr. Frederick Walton, whose Linoleum (see Encyclopædia Britannica), or elastic floor-cloth, is well known. The basis of the latter material is cork, and the new material is described as a "compressed mass of cellulose, paper, cork, etc., thoroughly impregnated with oxidized linseed-oil and resin." The substance thus produced is at first highly plastic, so that it can be spread into sheets of any desired thickness, and impressed with moulds so as to form raised patterns of any intricacy. It gradually hardens into an elastic, leathery, tough material, which possesses many valuable properties, since it is impervious to water, and is a bad conductor of heat, while it will bear very rough usage without injury. It can be made much more cheaply than embossed leather, or its papier-maché imitation, while it readily takes much deeper, sharper, and more lasting impressions. Used as tapestry, with decorations in imitation of ivory, gold, silver, bronze, etc., it is claimed that it can be furnished at one-fifteenth the price of leather. The interior decoration of buildings, except in those costly edifices to which hand-carving can be applied, has been hitherto very much in the flat. Wall papers have come into universal use, with an occasional instance of hand-frescoing. Decoration in relief in private residences has been confined to plaster mouldings, in conventional and often eye-wearying patterns. The recent growth of a higher taste in art has been met by more artistic designs in plaster, these being gilt, bronzed, or otherwise tinted, so as to be a relief rather than an annoyance to the eye. This new work, known in the trade as Gervita, is often highly beautiful and attractive. Lincrusta Walton is a simpler and more easily applicable device for producing the same general effect of carved work. It can be colored to any desired shade, and made to imitate costly woods, while it can be readily made to take the most intricate patterns in relief. It is applied to walls with glue and paste, in the same general manner as wall papers, and is so flexible that it can be carried around curves and corners without injury. The valuable properties claimed for it are: that it may be roughly scrubbed without injury, and that even if struck with a hammer the elastic material will swell out again; that it has no glaze to annoy the eye, or disturb the effects of light and shade; that it is a non-absorbent of moisture, and is always warm and dry; that it may be readily bronzed, gilded, or painted, to give any desired effect to the pattern; and that it may be removed from a wall without injury, and used again in other places. It is likely to come considerably into use for friezes and mouldings on cornices, for ceiling decoration, and for dadoes on the lower part of walls, where no brittle or readily injured decoration in relief could be safely used. There are many other decorative purposes to which such a substance is applicable. Among the latter it has been applied to exterior walls as a raised moulding, with very satisfactory effect, it resisting the weather admirably. "This beautiful plastic material is used mainly for interior decoration of private and public buildings, for which purpose it has no equal. It stands pre-eminent for high-art design, adaptability in color and style, sanitary excellence, economy, and durability." (C. M.)

LIND, Jenny. See Goldschmidt, Jenny.

See Vol. XIV. p. 655 Am. ed. (p. 648 Edin. ed.).

LINDEN. This is the most general name in America, though Lime and Basswood are not uncommon. It is often called Bee-tree, and sometimes Whitewood—a name more frequently given to the Tulip-tree. Lime is a corruption of the ancient Icelandic and Swedish name Lyme, which signified a band or cord—from the use of the inner bark. Lyneden or Linden is simply the adjective with its noun—the Lin-tree. The American Linden, *Tilia americana*, furnishes "bass-bark" equal to its European relative. The branches are steeped in water for about three months, and then stripped. It is not made into mats, but sold in large hanks for tying purposes in horticulture and agriculture. Nurserymen use it largely in budding fruit-trees. The name bee-tree comes from its value to bee-keepers. North Carolina honey is in high repute, the credit being given to linden flowers. Sugar has been made from its sap; and the copious covering of the leaves by a sweet liquid in this region is an argument adduced by those who contend that aphides and cocci are not the sole sources of honey-dew. A tea made of the flowers is deemed of great service, and is used as a sedative. The soft, light wood answers all the purposes of the European, but is superseded somewhat in America by that of the Tulip Poplar. As in Europe so in America, it thrives in the smoky atmosphere of cities, and is a common shade-tree. As is the case with all American trees it is more rugged in its growth than European congeners. The European does not stand the summer's heat and drouth like the American, and suffers much more than the American species from the attacks of a borer—*Saperda Vestita.* Its native habitats are chiefly in mountain regions, extending from New Brunswick through the Alleghenies, and it is found in the mountains of Mexico. As a general thing it grows taller and makes a larger trunk than the European, though specimens of the latter as much as 30 feet round are recorded in England. A species, *Tilia heterophylla*, with large leaves, very silvery on the under surface, is found from Pennsylvania south through the mountains of North Carolina and Tennessee. Its character and uses are similar to the other. The soft branches are sometimes fed to cattle in winter. (T. M.)

LINDSLEY, Philip (1786–1855), an American educator, was born at Morristown, N. J., Dec. 21, 1786. He graduated at Princeton College in 1804 and was tutor there 1807–09, and again in 1812. He was made professor of languages in 1813, and in 1817 vice-president, being then ordained to the Presbyterian ministry. His services were much sought for other institutions, and in 1824 he became president of the University of Nashville, where he was highly successful until 1850. He then removed to New Albany, Ind., and for two years was professor in the Presbyterian Theological Seminary there. He died at Nashville, Tenn., May 25, 1855. His *Works* with memoirs by Rev. L. J. Halsey were published in 1865.

His son, John Berrien Lindsley, was born at Princeton, N. J., Oct. 24, 1822, became in 1856 professor of chemistry and dean of the faculty in the medical department of the University of Nashville, but the institution, after a prosperous career, was closed by the civil war.

Another son, Nathan Lawrence Lindsley (1816–1868), was noted as a philologist and educator.

LINEN. See Textile Manufactures.

LING, Peter Henrik (1776–1839), a Swedish poet, inventor of the "movement cure," was born at Ljunga, Smaland, Nov. 15, 1776. He studied theology and afterwards wandered through Germany and France, leading an adventurous life. In 1805 he became fencing-master in the University of Lund, and in 1813 at the military school at Carlsberg. After study of anatomy and physiology he endeavored to adapt his gymnastics to the needs of various parts of the body. Again, the old Norse poetry roused his enthusiasm and he endeavored to reanimate its spirit by his *Gylfe* (1812) and *Asarne* (1816–26). In 1813 an institution was established at Stockholm according to his ideas and he was called to be its director. His success led to his being made member of the Swedish Academy and receiving various honors from the king. He died at Stockholm, May 3, 1839. After his death his *Elementary Principles of Gymnastics* was published, and other works on the "movement cure" have since been issued.

LINTON, William James, an English-American engraver, was born in London in 1812. He learned wood-engraving with G. W. Bonner, and in his youth was a zealous Chartist. In 1851 he assisted in founding *The Leader*, afterwards was editor of the *Pen and Pencil*, and also a contributor to the *Westminster Review* and other periodicals. Although noted as a writer he is deserving of higher praise as an engraver. He illustrated Jackson's *History of Wood-Engraving*, *The Lake Country*, and *Deceased British Artists*. In 1867 he removed to the United States, settling first at New York, and afterwards at New Haven. American magazines have profited by his admirable illustrations. He has greatly improved the art of wood-engraving, though his methods have not escaped criticism. He has published *Claribel and Other Poems*, *A Life of Thomas Paine*, *The English Republic*, *History of Wood-Engraving in America* (1883). He has also edited *Rare Poems of the Sixteenth and Seventeenth Centuries* (1883) and *Golden Apples of Hesperus* (1880).

His wife, **Eliza Lynn Linton**, was born at Keswick, England, in 1822. She has written several romances and contributed spirited papers to the *Saturday Review*, among which those on "The Girl of the Period" were the most noted. She also published *Joshua Davidson, Christian and Communist* (1872), and *Patricia Kemball* (1874).

LIST, Friedrich (1789–1846), a German political economist, was born at Reutlingen, Würtemberg, Aug. 6, 1789. He was made professor of political economy in the University of Tübingen in 1817, and in 1819 became agent of the German commercial union. In 1821 he was elected to the diet of Würtemberg, but having exposed the corrupt practices of the administration he was sentenced to ten months' imprisonment. For a time he found refuge in Switzerland, but returned in 1824 and was imprisoned at Asperg. Allowed to emigrate to America he settled in Pennsylvania, and attracted attention by his *Outlines of a New System of Political Economy* (1827). He made large purchases of land, and became wealthy through his discovery of anthracite in them and the construction of railroads. In 1830 he was made U. S. consul at Hamburg and in 1833 at Leipsic, and in 1837 went to live at Paris. He exerted himself for the promotion of the German commercial union, and suggested a commercial alliance between England and Germany. Some loss of property so affected his mind that, in a fit of melancholy, he shot himself at Kufstein, Tyrol, Nov. 30, 1846. His *Nationale System der politischen Oekonomie* (1841) was translated into English by Dr. Matile and published by Stephen Colwell (1856). List's complete works, with a biography by Häusser, were published at Stuttgart (1851).

LISZT, Franz, a Hungarian pianist and composer, was born at Raiding, Oct. 22, 1811. His father, a steward of Prince Esterhazy, observing his remarkable aptitude for music, had him carefully trained on the piano. At the age of nine he performed so well at a concert at Presburg that some noblemen bore the expense of his instruction at Vienna by Czerny and Salierni. When taken to Paris in 1823 he was excluded from the Conservatory as being a foreigner, but he obtained the best instruction and gained great triumphs by his concerts before the Duke of Orleans. His father still compelled him to practise with unremitting diligence, while concerts in the provinces and in England furnished the means. In 1825 his attempt at an opera was a failure. When his father died in 1827, Liszt, overcome with grief, retired from the world. His sensitive nature was morbidly affected by the life of Paris. He became an adherent of Saint Simon, and in 1830 composed a *Symphonie revolutionnaire*, but being restored to his normal mood by the triumph of Paganini in 1831 he determined to become the Paganini of the piano-forte. Alternately studying and giving concerts for years, and showing remarkable powers of improvisation, he returned in 1838 to his native land, where he was received with extraordinary honors at Pesth. Thenceforth he enjoyed a series of triumphs in various parts of Germany until 1847, when he was made conductor of the opera at the court of the duke of Weimar. Hither for ten years all music-lovers were attracted by his masterly execution of the works of Bach, Handel, Beethoven, and Weber. Liszt produced some important works of his own, but he gave the preference to works of others. He also befriended young men of genius, among whom was Richard Wagner, who afterwards married his benefactor's daughter. In 1861 Liszt went to Rome and was received with great favor. He resolved to devote himself to the service of the church, and in 1865 took holy orders, being known henceforth as Abbé Liszt. In 1871 he left Rome and fixed his residence at Pesth, to whose museum he soon after presented his valuable collection of works of art. A pension was granted to him and also the title of baron. In 1875 he was made director of the Hungarian Academy of Music. The works of Liszt comprise *Fantasias*, *Poemes Symphoniques*, the grand symphonies *Faust* and the *Divina Commedia*, the two oratorios *Der Heilige Elisabeth* and *Christus*, several grand masses, and numerous variations. He also published a *Life of Chopin* (1854), a dissertation on *Bohemians and their Music in Hungary* (1859), and many articles on modern music.

LITERARY PROPERTY. See Property.

See Vol. XIV. p. 703 Am. ed. (p. 697 Edin. ed.).

LITHOGRAPHY, both in its general principles and its general methods, is the same art to-day that it was many years ago. No new discovery of special importance has been made, either in principles or methods. And yet, viewed in its economical aspects, it is almost a new art. Very many minute steps of progress in every detail of the process have been made, and these, if taken together, amount to a great development. We shall confine ourselves to a description of some of the more important of these improvements.

One very interesting feature in the case is the fact that the original lithographic stone, the Solenhofen slate of Bavaria, employed by Senefelder, the discoverer of the art, is the only satisfactory material yet known. Stones from several localities in America, as from Canada, Kentucky, and St. Louis, have been proposed as substitutes, yet none of them have proved available for the purpose. In fact, the only rival of the Bavarian stone to-day is zinc, and this has not yet proved suitable for the finer effects of lithography. The improvements which have taken place are in the presses, and in the methods of drawing or transfer upon the stone. In the latter there are two important recent discoveries which remarkably facilitate the process and enable the design to be laid upon the stone with much greater rapidity and accuracy than formerly.

In nearly every drawing there are considerable spaces where simple effects of shading are alone necessary, these being produced by lines, grains, stipples, and other textures. This filling-in work occupies considerable time, which is saved by one of the processes mentioned. In this the lines, stipples, or other markings are moulded in points or ridges on one face of a rubber sheet. This face is then inked and laid flat upon the stone, while pressure is brought upon the necessary portions of the smooth side of the rubber. As a consequence, the impression is transferred to the stone with remarkable rapidity, and with a clearness and perfection which no hand-work can imitate. Engravings produced by this process yield highly satisfactory results.

The other process referred to is that known as the *air-brush.* The operation of this, and the effects produced, are of a highly interesting character. The brush is connected by tubes with a bellows worked by the foot, so that a constant current of air may be blown into it, and out at a minute point or aperture. The ink, flowing through another tube to the same aperture, is blown out as a fine spray by the air-current. The operation is like that of an *atomizer.* The drawing is made by the brush. As this approaches the stone the line of ink becomes narrow and dark. As it is lifted from the stone the ink-spray widens and grows thinner, so that every variety of effect, from the lightest field to the darkest shading, can be readily produced, and with a rapidity far beyond that of the old method of drawing. The flow of ink also can be increased or diminished by simple pressure of the fingers, thus rendering it possible to produce with great ease fields of specially strong light and shade.

An equal growth of improvement has been made in presses, and the rapidity and sureness of movement of these have been very greatly increased. In fact, the presses of to-day can produce 800 to 1200, and in some cases even 1500 impressions per hour, and do excellent work. Ten years ago such service as this would have been considered impossible. We cannot enumerate all the many small points of improvement. One of these, of great value, is the use of the brake. In most presses a stoppage takes place during the reverse movement of the stone. Such frequent dead stops in rapidly revolving machinery is very racking and injurious. This is now obviated by the action of a brake on the cylinder, which brings the machinery to rest gradually and without jar or strain.

Another minor improvement has reference to the motion of the inking rollers. Formerly they were caused to revolve by the friction of the stone itself, and any slight variation in diameter produced uneven action. Now they are moved by the action of a separate *rider*, and slight variations in size produce no injurious effect. Such are a few of the many improvements which have added so greatly to the performance of presses. Very many presses are in the market, the Hoe, Potter, and Campbell being among the best known. The latter has the advantages that it moves constantly, reversing its motion when the stone reverses, and that its cylinder is unusually small, thus reducing the area of the stone on which the pressure is successively exerted. This is important, as in lithography the pressure must be local, and carried in succession over the whole stone, while in type-printing pressure may be brought to bear on the whole surface simultaneously.

Thus, though the principle of lithography has not changed, its methods of application, and the care and skill exerted have greatly improved, and very striking effects can now be produced. Crayon work, for instance, can be transferred and prints made hardly distinguishable from the original drawing. The art of lithography is growing more and more into favor and its use increasing constantly. The effort to produce lithographic copies in color of oil-paintings meets with less favor, owing to the great quantity of cheap and inferior work produced. Yet some highly meritorious examples of this kind have been done. But smaller work in colors—for advertising cards, etc.—has grown to be a very important branch of modern lithography.

LITHOTOMY is the original operation for the extraction of a stone or stones from the urinary bladder. It was devised by Peter Franco and perfected by William Cheselden (1688–1752). There are various methods of reaching the bladder. The commonest by far, and in general the best, is by the "lateral" operation, in which an incision made on the left side of the patient's perineum; that is, in front and a little to the left of the anus. The "median" operation is by an incision in the middle line directly in front of the anus. The "bilateral" operation is at the same point, the incision being made, however, transversely. The "supra-pubic" operation is done by an incision at the lowest point of the abdomen. The chief advantage of the last is in that it allows of the extraction of very large stones. In young persons the low mortality of lithotomy makes it the preferable operation by far. In older persons some form of crushing the stone is to be preferred.

Prof. S. D. Gross gives the statistics as follows: In 13,570 operations of lithotomy by all methods, the total mortality was 1549 or 11.40 per cent. In 11,987 operations by the "lateral" method, 1278, or nearly 10 per cent., died. In young subjects the mortality is only about 3 per cent.

Lithotrity was introduced by J. Civiale (1792–1867), of Paris in 1824. It consists in the introduction of a lithotrite, by which the stone is seized between two jaws (one of which is movable) and crushed in the bladder. This is done without an anæsthetic on account of the danger of injury to the walls of the bladder. After a short sitting the operation is concluded, and is resumed at a later date, when the original fragments are still further crushed, and so on till the entire stone is got rid of, the fragments of each crushing being voided by the urine. Prof. S. D. Gross gives the statistics as follows: In 1470 cases 159 or 10.81 per cent. were fatal. As these were chiefly old persons, the mortality should be compared with that for lithotomy at similar ages. Sir Henry Thompson gives the mortality of the latter operation in hospital practice (which is somewhat less favorable than that in private practice) as follows: From 49 to 70 years of age the mortality of lithotomy was 24.2 per cent.; from 71 to 81 years of age it was 31.5 per cent. The advantages of lithotrity are therefore very evident in persons over 50 years old.

Litholapaxy, or "rapid lithotrity," was introduced by Prof. Henry J. Bigelow, M. D., of Boston, in 1878. Recent investigation, chiefly by American surgeons, had shown that the calibre of the urethra was much larger than had before been believed. Hence larger instruments could be introduced into the bladder and larger fragments of a crushed stone be removed. Moreover he showed that with the proper skill the operation could be done under an anæsthetic and so be much more prolonged than before, and thus be completed at one sitting. Indeed, he has prolonged the operation to even 4 hours. Usually one hour is sufficient. The same method is employed as in lithotrity for crushing the stone, but its fragments, instead of being left to act as irritants, are removed by a suction apparatus; the entire stone being thus removed at a single sitting. The operation is adapted to all ages save the young, in whom, as yet, lithotomy is still the best operation. Of 312 operations tabulated by Prof. S. D. Gross, 17, or 5.45 per cent., were fatal. Sir Henry Thompson and others have reduced the mortality of the operation to 3.33 per cent. When compared with the results of lithotomy in persons over 20 years of age, and the results of lithotrity which is generally done on older persons, this shows a marked advantage.

LITTELL, Eliakim (1797–1870), an American publisher, was born at Burlington, N. J., Jan. 2, 1797. Having learned the printer's trade, he began in 1819 to publish at Philadelphia the *National Recorder* and in 1822 the *Museum of Foreign Literature*, which presented to American readers selections from the best periodical literature of Europe. Afterwards removing to Boston, he established *Littell's Living Age*, a weekly magazine of the same character, which still maintains its place. Mr. Littell died at Brookline, Mass., May 17, 1870. He drafted the Clay Compromise Tariff in 1833.

LITTLEDALE, Richard Frederick, an English clergyman, was born in Dublin, Sept. 14, 1833. He graduated at Trinity College in 1854, and was ordained in the Church of England in 1856. After holding a curacy in London for five years he was obliged by ill health to give up parish work. He has since been active in literary work on ritualism and other subjects connected with the church. He continued and completed Rev. J. M. Neale's *Commentary on the Psalms* (4 vols., 1868–74), and published a *Commentary on the Song of Songs* (1869). Among his works are *Philosophy of Revivals* (1860); *Early Christian Ritual* (1869); *Misapplied Texts of Scripture* (1870).

LITTLE FALLS, a village of New York, in Herkimer county, is on both sides of the Mohawk River, 73 miles W. N. W. of Albany. It is on the New York Central and the West Shore and Buffalo Railroads. Here the river, passing through a narrow and picturesque rocky gorge, has a fall of 44 feet, by a series of rapids, and affords great and well-utilized water-power. The town is chiefly built on steep hillsides, and is very attractive in appearance. Little Falls is one of the largest cheese-markets in the world, the surrounding country being a fine dairy region. The town has an academy and a bank, and manufactures cotton goods, axes, knit goods, woollens, paper, castings, etc. Population in 1870, 5387; in 1880, 6910.

LITTLE ROCK, the capital of Arkansas and seat of justice of Pulaski county, is on the S. bank of the navigable Arkansas River, in 34° 42′ N. lat., 92° 16′ W. long. The St. Louis, Iron Mountain, and Southern Railroad passes through the city, and the Little Rock and Fort Smith, the Little Rock, Mississippi River, and Texas, and the Memphis and Little Rock Railroads terminate in it. The city contains the State capitol, the State library, asylums for the blind and deaf-mutes, St. John's Military College, a State prison, a U. S. arsenal, high-schools, a ladies' seminary, a convent, national and private banks, the Roman Catholic Cathedral of St. Andrew and many other churches, and 2 daily and 8 weekly newspapers. It is the seat of Episcopalian and Roman Catholic bishops. The principal articles of manufacture are flour, castings, carriages, and wagons. Population in 1870, 12,380; in 1880, 13,138.

LITTRÉ, Maximilian Paul Émile (1801–1881), a French philologist, was born at Paris, Feb. 1, 1801. He was early distinguished for intellectual ability and, though he studied medicine, he soon devoted himself to literature. The first volume of his admirable translation of the *Works of Hippocrates*, appearing in 1839, procured his admission to the Academy of Inscriptions. Littré fully sympathized with the current of national feeling; he was a democrat by conviction, and for a time assisted in editing *Le National* as well as other journals. On the publication of Comté's positive philosophy, Littré adopted the doctrine with ardor, and in 1845 published a defence of it in his *De la Philosophie positive*. He also published an *Application de la Philosophie positive au Gouvernement des Sociétés* (1849). His political work ceased about this time, and in 1854 he became editor of the *Journal des Savants*. After publishing an excellent *Histoire de la Langue française* (1862) he commenced the publication of his *magnum opus*, the *Dictionnaire de la Langue française*, which was completed in 1873, after thirty years of arduous labor. It fully realizes the advanced ideas of the present time on the subject of lexicography by its minute research, its regard for historical development, and its accuracy in etymology and definition. In 1871 Littré was appointed by Gambetta professor of history and geography in the Polytechnic School, then at Bordeaux, and in the same year he was chosen a member of the Academy. This act led to the resignation of Bishop Dupanloup, who had strenuously opposed his admission for several years. Littré had also been elected to the Chamber of Deputies, and in 1875 he was chosen senator for life. Yet he was not hereby drawn to take any active part in political affairs. From his numerous articles in journals and reviews, relating generally to linguistics, natural science, and history, have been gathered some volumes on *Médecine et Médecins* (1871); *La Science au point de vue philosophique* (1873); *Fragments de philosophie positive* (1876). Littré rejected some of the later works of Comte as unworthy of him, and thereby separated himself from the main part of Comte's followers. Although he had without entering into polemics maintained an unswerving attitude of hostility to the Catholic Church, yet at the last he is said to have yielded to the request of his devoted wife and daughter and to have taken the sacraments. He died June 2, 1881.

LIVINGSTON, Brockholst (1757–1823), an American jurist, was born in New York, Nov. 25, 1757. He was the son of Gov. William Livingston and was educated at Princeton College, but left it to serve on the staff of Gen. Philip Schuyler. He was afterwards major on the staff of Gen. B. Arnold, and shared in the capture of Burgoyne. In 1779 he became private secretary to John Jay on his embassy to Spain. Returning in 1782 he was admitted to the bar in 1783, and soon rose to eminence. He was made a judge of the Supreme Court of New York in 1802, and in 1806 was appointed a judge of the U. S. Supreme Court. This position he held till his death, at Washington, March 19, 1823.

LIVINGSTON, John Henry (1746–1825), an American clergyman, was born at Poughkeepsie, N. Y., May 30, 1746. He graduated at Yale College in 1762 and commenced the study of law, but afterwards studied theology at Utrecht, Holland. Having been ordained by the classis of Amsterdam, he became pastor of the Dutch church in New York city. By his prudence and good management he reconciled the parties in the American Reformed Church and effected its independence from the Church of Holland. Compelled to leave the city of New York on its occupation by the British, he preached at Albany and afterward at Kingston and Poughkeepsie. He returned in 1783, and from 1795 to 1797 he was also professor of divinity in a seminary at Belford, L. I. In 1807 he was appointed president and professor of theology in Queen's College, Brunswick, N. J., and he removed to this city in 1810. Here he died, Jan. 20, 1825. His *Life* was published by Rev. A. Gunn (1829).

LIVINGSTON, Philip (1716–1778), an American statesman, was born at Albany, N. Y., Jan. 15, 1716, being a grandson of Robert Livingston, the founder of the Livingston family in America. He graduated at Yale College in 1737, became a merchant in New York city, and in 1758 was elected to the legislature. In 1768 he was speaker of the house, but in 1769 he was unseated by the Tory majority. In 1774 he became a member of the Continental Congress, in which he signed the Declaration of Independence in 1776. He died at York, Pa., June 12, 1778. He had been liberal to colleges, and during the Revolutionary war sold part of his property to sustain the public credit.

LIVINGSTON, William (1723–1790), an American statesman, was born at Albany, N. Y., Nov. 30, 1723. He graduated at Yale College in 1741 and became an eminent lawyer. With William Smith, Jr., he published the first *Digest of the Colony Laws* (1752). In 1758 he was elected to the New York assembly, but in 1773 he built a house called Liberty Hall at Elizabethtown, N. J., and there spent the remainder of his life. He was a delegate to the first Continental Congress from New Jersey, and in 1776 was made governor. Several expeditions were sent by the British from New York to capture that "Don Quixote of the Jerseys," but he always made his escape. In 1787 he was a delegate to the convention to frame the constitution. He died at Elizabethtown, N. J., July 25, 1790. His publications were chiefly political and miscellaneous tracts.

LOBBY. The corridors and antechambers of the

British houses of Parliament and of the Congress of the United States have always been spoken of as the lobbies. In this country, soon after the capitol rose at Washington, the word "lobby" was more specifically applied to the private corridor in the rear of the Senate and House of Representatives, to which only members of the two bodies or properly accredited friends of theirs had access. It was a gratifying courtesy that was extended by legislators with moderation and rarely abused in the early days of the nation's history. But it soon came about that privileges of this character were eagerly sought by men who used them for the purpose of influencing legislation. The "privilege of the lobby" developed into a right that was worth money to the person who granted it as well as to the beneficiary. Even before the days of open corruption the lobby and the persons who frequented it came to be called "the third house of Congress." Very soon thereafter the name of the place where these hired agents of unknown principals congregated had been fastened upon the individuals themselves. The term "lobbyist" became a part of the language, though formed in defiance of generally recognized rules. The date of the advent of the word is disputed by lexicographers. In the early days of the lobby (and we now refer to the people who use it unworthily) ex-members of the Senate or House were the most available material for intermediaries between those who wanted legislation and those who had power to grant it. Under the rules they had the right of entrance to the floors of the Senate chamber or the House of Representatives, and could talk with members in their seats or in the cloak-rooms. Covertly, as personal friends, or frankly, as paid counsel for a subsidy scheme or a railroad land grant, they could urge their measures upon the members in divers and various ways.

The professional lobbyist is of later development. He rarely appeared at the capitol. If he did it was in the privacy of a committee room, to which, likely as not, he carried a key and could conduct and entertain his guests. He rarely appeared openly before a committee. He preferred to operate upon the members of a committee separately. Much ingenuity was exercised in winning the confidence of the man who was to be corrupted and morally destroyed. The favorite plan was to get the desired bill introduced by a member who was partially in the secret of its meaning, and then to secure its prompt reference to the desired committee without reading (except by its title, generally harmless in sound). The next move was to secure its consideration and "thorough investigation" by a sub-committee of one or three members of the general committee. If the scheme involved a large amount of money, land, or vested interests, a sub-committee of three was considered preferable. Its report would carry more weight and would influence the weak members of the main committee. It was desirable, of course, for the lobbyist to control the chairman of the House or Senate committee. If he did, he could name the members that would form the sub-committee. If he could not establish such relations, he might employ the clerk of the committee and attain his control of the appointing power in that way. Cases have been known in which the names of such a sub-committee were altered by the clerk of a committee to meet the wishes of the master whom he served. The records of the clerk are the official proofs of selection. From them there is little risk of appeal.

The chief of a gang of lobbyists must not make a single error, as he is liable to prompt exposure. He must be a keen and accurate judge of humanity. He must know what men can be secured through their friends. Many members of Congress leave home with the purest intentions and are daily sold and delivered by personal friends whom they do not suspect of turpitude. A good dinner or a case of wine will capture others whom money would not purchase. It is humiliating to confess, however, that the larger number of corrupt lawmakers are bought with cash. Some members have preferred to accept such sums as "loans," or in the shape of money advanced on notes without date or with some vitiating clause.

The story of the achievements of the lobby in the Congress of the United States would make a terrible narrative. An examination of the development of an individual will enable us to study the growth of the type. For a quarter of a century there lived at Washington a refined and cultivated gentleman who was proud of the title of "King of the Lobby." He even inscribed himself on one occasion "Vestibuli Rex." He codified the rules of the lobby. He reduced the various methods of passing bills through Congress, good, bad, or indifferent, to a fine art. He needed only to be told exactly what legislation was desired. From that hour he became the directing genius of the enterprise that underlaid the projected bill. He advised as to what points might be urged, what asked only for the purpose of subsequent concession or relinquishment. It pleased a committee, he often said, to believe that it amends a bill. When this point had been reached he drew the bill himself. Then he decided in which house of Congress it should originate. Next the roll of that particular body was carefully scrutinized. It was marvellous how much he knew about every man on the floor. He divined each man's secret ambition, and appeared to have as a sole object in life the attainment of it by the man he cultivated. It was his boast that he never had failed to secure a vote that he once undertook to get. Many men he never approached.

His delight was a Congress in which the balance of power was narrow, so that by artfully engrafting on his bill some political character, or attributes, he could secure a strict party vote. Then he knew exactly how many votes it would be necessary to buy. He aimed at success—certain and unequivocal. A remarkable fact about nearly all of his many transactions was that he not only secured their passage but clinched them with the executive approval of Presidents far above even the suspicion of corruption. It is a sad and dreadful picture, this man's life, and yet he had the instincts of a scholar and the breeding of a gentleman.

Two great exposures of official corruption stand out as landmarks in the history of the lobby. They have gone into history as "The Credit Mobilier" and "The Pacific Mail Steamship Company Subsidy." The Credit Mobilier was a combination of men who undertook to build the first transcontinental railway to the Pacific Ocean. Charles Francis Adams, Jr., of Boston, has written its history fully and mercilessly. When the exposure came it relegated several prominent statesmen to obscurity and the grave. The effect was to compel comparative honesty. Corruption was made very odious. The nation had a revulsion of feeling, and a spasmodic epidemic of integrity spread everywhere. So the public believed and members of Congress declared. Yet at that very time the bill to pay the Pacific Mail Steamship Company a subsidy of $500,000 annually was quietly being worked through both houses of Congress. As subsequent investigation showed, it cost the Pacific Mail Steamship Company $600,000 to get that subsidy granted.

There is yet another type of lobbyist. He is a hired attorney at the national and State capitals to prevent the introduction, consideration, or enactment of measures prejudicial to the great corporation or the vested interest that employs and pays him. The necessity for such a person opens up another painful phase of this unpleasant subject, because it is a fact of susceptible demonstration that many bills are introduced for the sole purpose of compelling their extinction by purchase. This branch of the general topic would more properly belong under the title of "Black-mail." (J. C.)

LOBSTER, a name given to the crustacean genus

Homarus and also to some species of diverse genera, such as *Palinurus*. The common lobster is allied to the fresh-water crayfish, from which it differs in size and in several anatomical points. It is a member of the decapod, or ten-footed crustacea, the anterior pair of feet being converted into enormous claws. These open and shut like strong pincers, one of them being provided with many sharp tooth-like serrations, the other with a few blunt tubercles. It has a narrow and spiny rostrum and very long antennæ. The eyes are borne on movable peduncles. The abdomen is composed of seven segments, with six pairs of natatory appendages beneath. This forms the principal organ of locomotion. By its being suddenly bent downward and under the animal is driven backward with great velocity. The shell is olive or blackish-green in color, and has the peculiarity that it becomes red under the action of boiling water. Respiration is branchial, there being 19 branchiæ on each side. The stomach has in its pyloric region 3 solid movable pieces of chitine, called the "lady," from a fancied resemblance to a lady sitting. They are probably masticating teeth. The greenish glandular organ, with fat cells, popularly called "tom alley," is the liver. There are three well-determined species of *Homarus*, known as *H. vulgaris*, the Norway lobster, *H. americana*, nearly related to the preceding, and *H. capensis*, a smaller species of the Cape of Good Hope. The American species, when adult, is from 1 to 2 feet long and weighs from 2 to 15 pounds. It is a voracious animal and feeds on any kind of animal food, either fresh or decaying. It lives on rocky, gravelly, and sandy bottoms, from low water to 20 or 30 fathoms, but probably not much deeper, and has a migratory habit, moving rapidly in considerable numbers, the largest and strongest in front, the weakest in the rear. Reaching good feeding-grounds they scatter and devour the clams, mussels, and other food-animals found there.

The lobster lays from 2000 to 12,000 eggs, of which probably 1000 are hatched. The eggs are carried under the abdomen, and the young remain there for many days, when they drop off to shift for themselves. The breeding period varies very much from south to north. South of Cape Cod it lasts from April 1 till late in June. In the Bay of Fundy it extends from midsummer to September. The young lobster lives a very different life from the adult. At first it is not more than one-third of an inch long, with scarcely any resemblance to the lobster. It swims freely in this state. With every change of skin it grows more lobster-like, and when a little over one-half inch long it looks like a little lobster, yet still swims freely by aid of long swimming branches to the legs. After it has grown a few inches long the growth becomes very slow. It probably moults but once a year, with but a moderate growth at each change. Large-sized lobsters seem to change their shells yet more seldom. They very readily part with their large claws when caught by them, or when suddenly alarmed. The lost claws are replaced by new ones.

The lobster has long been a favorite article of food, and millions are taken yearly. Norway is the principal source of the European supply. The fishing here was begun by the Dutch in the seventeenth century, the natives previously not esteeming the lobster as food. The average annual exportation from this region from 1861 to 1870 was 1,463,000. From 1871 to 1880 about 1,000,000. In 1880 it was 991,000. This indicates a decline in the catch, which is undoubtedly due to overfishing, especially during the breeding season. Restrictive measures have recently been adopted. In Europe the rock lobster (*Palinurus vulgaris*) is nearly as much sought as an article of food as the common lobster. It differs from the latter in the absence of pincers and in other particulars. On the American coast the lobster-fishing is an important industry. In Long Island Sound it begins about April 1, and continues till late in autumn, though the principal catch is in May and June. On the coast of Maine and Northern Massachusetts, whence the winter supply comes, the fishery continues nearly all the year round. In Norway the lobsters were formerly caught with wooden tongs, but the American lobster-pot is now everywhere used. This consists of a basket with a funnel-shaped end, the funnel leading downward to a hole by which the lobster can enter, but from which its claws prevent it from escaping. It is baited with fish of little value, sunk by stones, and its place marked by a float. The catch on the American coast cannot be definitely given, though it is claimed that nearly a million lobsters are annually sold in Boston. The limit of salable size in Massachusetts is fixed by law at 10½ inches. A very large trade in canned lobsters has grown up on the North American coast, there being a large exportation trade from the Portland canneries. The catch for this purpose is so enormous that it is apprehended that the supply will soon be seriously diminished unless some restriction be adopted. A few years ago lobsters of 10 to 20 pounds weight were not uncommon. Now the average weight is from 3 to 6 pounds. On the coasts of Nova Scotia and New Brunswick lobsters exist so abundantly that on certain occasions they have been used freely as manure. In 1873 more than 4,000,000 one-pound cans were exported from British America; there being put up in Nova Scotia in that year 3,462,298 cans, and in New Brunswick 1,387,700 cans. More recently overfishing seems to be everywhere diminishing the catch.

(C. M.)

See Vol. XIV. p. 750 Am. ed. (p. 744 Edin. ed.).

LOCK. The pre-eminence which America has achieved in the art of lock-making necessitates a short description of the development of the industry in this country. The ingenuity of American mechanics has been tested to an extraordinary degree, both in the picking of the most skilfully devised locks of English manufacture and in the making of locks that have hitherto proved absolutely unpickable, while the general application of machinery to lock-making has given a neatness and precision to the parts of the American lock which are nowhere else approached. In the primitive period of this country the lock was unknown as an American institution. A hundred years ago it was of the simplest construction, and two or three sufficed for all the purposes of a household. Now every door and drawer must have its lock, so that hundreds are used where one was formerly employed, while the skill of burglars has stimulated the ingenuity of mechanics to devise locks that shall absolutely defy their arts. The invention of the tumbler lock by Barron in 1778, of the more complex Bramah lock in 1788, and of the Chubb's lock in 1818 stimulated American inventors, and many efforts to devise an unpickable lock were made in this country. Success was first approached by Dr. Andrews, of Perth Amboy, N. J., who in 1841 invented a permutation lock, in which a number of rings attached to the key permitted an endless variety of combinations. In this lock, when the bolt was turned, the lock could not be moved except with exactly the same combination of the key. The lock had tumblers and a detector, an ingenious English device, which prevented the tumbler from releasing the bolt if lifted too high. This lock was greatly admired, but was picked by Mr. Newell, of New York. In 1843 a lock with two sets of tumblers was produced. The inventor offered $500 to any one who could pick this. It was picked by Pettitt and Hall, of Boston, by the smoke process. This is a burglar's device, in which a smoky flame is blown into the key-hole, leaving a deposit of lampblack on the tumblers. Then a key is introduced, and after its removal a strong light is thrown in by a reflector, by which the key-marks on the tumblers are shown. Thus the proper shape of key is indicated. The next effort was to keep the interior from view by making the key-hole small, and interposing a curtain. The

London World's Fair of 1851 brought this lock problem into special prominence. The celebrated Bramah lock, which had long defied pickers with a standing offer of 200 guineas, was readily picked by Mr. Hobbs, of Boston, after he had similarly opened a Chubb's lock. He employed what is known as the tentative process, using the sense of feeling to make his way through the difficulties of the lock. In his turn he offered the Parautoptic lock, the invention of Mr. Pyes, its distinctive feature being the use of eccentric rings and a curtain. It defied the efforts of English locksmiths, but in its turn yielded in 1855 to American ingenuity, being picked by Linus Yale, Jr., of Philadelphia. In 1843 Linus Yale, Sr., had invented a lock which was deemed absolutely unpickable until picked by his son. There was by this time a furor on the subject of locks. The younger Yale had declared that any lock using a key of a winged form, which rubs an impression on tumblers, can be picked. To obviate this he invented a lock in 1851 which he called the "magic lock," and which has never been picked. In this extraordinary invention the key and its bits, though apparently of one piece, are separable. On inserting the key into the lock the bits are taken off by a pin. The key being turned puts in motion a set of wheels which carry off the bits to a remote part of the lock, out of the reach of picking tools, where they act upon the tumblers, arranging them for the drawing of the bolt. Meanwhile the wheels close up the key-hole solidly. Afterwards the bits return and rejoin the key-handle. Another unpickable lock of American manufacture is the Hall rotary-combination lock. This absolutely dispenses with a key, and is opened by turning a knob one way and then the other certain distances, according to a set of numbers in the mind of the operator. The only unpickable English lock as yet devised is that of Denison, invented in 1852. This has a very narrow key-hole, and is locked by turning a handle, but needs a key to open it. It is not much in use, an improved Chubb's lock being the favorite in England. The puzzle, letter, and dial-locks are now almost out of date. These could only be opened by setting a number of rings to a certain combination of letters. Hobbs proved that they could all be picked, while the difficulty of handling them, and the danger of forgetting the combination, reduced their popularity. In the year 1831 the time-lock, or a lock operated by clock-work, was introduced by Mr. Rutherford, of Jedburgh, Scotland. In this a revolving circular stop-plate holds the bolt until it has moved so far that a notch in its rim permits the bolt to pass. It may be made to rotate quickly or slowly, so that the lock can be set to open at a definite time. This original time-lock has been very greatly improved upon by the Yale time-lock now in use. Since 1851 the American locks have sustained the reputation then gained. Mr. Denison, the celebrated London lock-maker, says that they are "vastly superior to anything we have ever seen made in England, and on the whole the United States are far ahead of us in the manufacture of both good and cheap locks." The parts of American locks, except those that can be cast, are now made by machinery, and are as exact as the similar parts of a watch, while the cast parts are the perfection of small castings. American lock-hardware is everywhere esteemed abroad, the ordinary Yale lock in particular being very widely used. The principal factories are in New England and the Middle States. (C. M.)

LOCKE, David Ross, an American humorist, was born at Vestal, Broome co., N. Y., Sept. 20, 1833. He became a printer and was connected with various newspapers in Ohio. While editor of the Findley *Jeffersonian* in 1860 he began to insert political letters under the name of "Petroleum Vesuvius Nasby," whose pungent satire of secession gave them wide currency. In 1865 Mr. Locke became editor of the Toledo *Blade*, in which he satirized President Johnson's methods of reconstructing the Southern States. The three series of his *Nasby Letters* were gathered into a single volume in 1869, and Mr. Locke has since published *The Morals of Abou ben Adhem* (1875).

LOCK HAVEN, a city of Pennsylvania, county-seat of Clinton county, is handsomely situated on the S. bank of the West Branch of the Susquehanna, 25 miles W. S. W. of Williamsport. It is on the Philadelphia and Erie Railroad at the junction of the Bald Eagle Valley branch of the Pennsylvania Railroad, and on the West Branch Canal. It stands in a beautiful mountain-valley. The manufacture and shipment of pine and other lumber is the chief business interest. It has churches of all the leading denominations, 2 national banks, several newspapers, excellent public and private schools, a State normal school, good hotels, gas-works, large foundries and tanneries, several machine-shops and planing-mills, and extensive saw-mills, most of the power being from steam. Population in 1880, 5845.

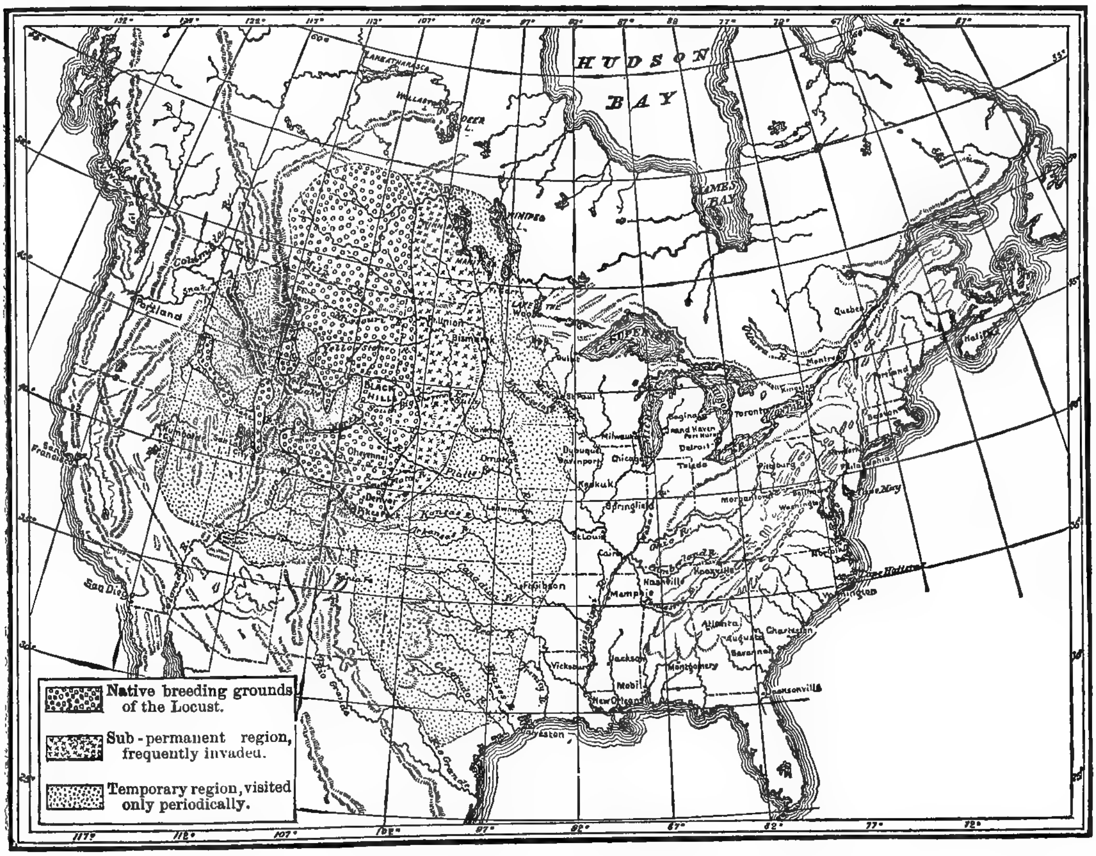
LOCKPORT, a city of New York, county-seat of Niagara county, is on the Erie Canal, on the New York Central Railroad at the junction of a branch, and also on a branch of the Erie Railroad, 25 miles N. N. E. of Buffalo. The 10 massive locks of the canal, which here makes a descent of 66 feet, give name to the town. The canal affords great water-power, which is utilized in a large number of mills and factories, including flour- and lumber-mills, machine-shops, foundries, cotton- and woollen-mills, and other establishments, some of which are of great extent. The canal itself here passes through a deep cut several miles in length, excavated in the solid rock. Lockport has many churches, excellent public schools, 3 national and 3 other banks, a female seminary, and 2 daily and 5 weekly newspapers. Large quantities of Niagara limestone and sandstone are here quarried for building purposes. The town has Holly waterworks and the Holly system of distributing heat by means of steam. Population in 1870, 12,426; in 1880, 13,522.

LOCKYER, Joseph Norman, an English astronomer, was born at Rugby, May 17, 1836. He was educated partly on the continent and entered the British War Office in 1857. In 1872 he was transferred to the science and art department, which he had assisted in establishing. In 1860, on account of his labors in astronomy, he had been made a fellow of the Royal Astronomical Society, and in 1869 was elected to the Royal Society. He was chief of the expedition sent to Sicily in 1870 to observe the solar eclipse, and again of that to India in 1871. Among his works are *Elementary Lessons in Astronomy*; *Contributions to Solar Physics* (1873); *The Spectroscope* (1873); *Studies in Spectrum Analysis* (1878); *Star Gazing, Past and Present* (1878). In 1874 he became editor of *Nature*.

LOCUST, Rocky Mountain (*Caloptenus spretus*, Thos.).—This insect, also known as the "Western grasshopper," is the most destructive of the migratory locusts of the United States. It is a western species, never crossing to the east of the Mississippi Valley, and its history prior to the thick settlement of the trans-Mississippi country is difficult to trace. Injuries are recorded from time to time, from 1818 down to 1864, when the damage from swarms in the North-west, and in Kansas, Nebraska, and North-western Texas, was sufficiently great to attract national attention. From 1873 to 1876 disastrous swarms swept over all the more thickly settled portions of the Mississippi Valley west of the 94th meridian, and the loss in 1874 alone was estimated at $50,000,000. In 1875, and,

Rocky Mountain Locust (*Caloptenus spretus*).

notably, in 1876, the damage was enormous, and so many thousands of families were impoverished, even to starvation, in Kansas, Colorado, and Nebraska, as to call for aid in food and clothing from the whole country. Since that year there has been no general invasion. During these years extended observations were made upon the species, and many important facts and discoveries were published, especially in the *Reports* (7, 8, 9) of the State Entomologist of Missouri. In March, 1877, the U. S. Entomological Commission was created, by act of Congress, for the purpose of studying the pest and the best means of controlling it. The first circular of the commission was issued in March, 1877. This was followed by other circulars, and, in the summer of 1878, by its *First Report* (750 pp.), which with the *Second Report* (1880), a volume of nearly the same size, makes an encyclopædia of all that is worth knowing in regard to the insect.



Region of Rocky Mountain Locust.

The territory overrun by this locust is divisible into three regions. The first of these, called the "permanent region," embraces the native breeding-grounds, where the insect is always found in greater or less abundance. It includes a small strip of Eastern Oregon and Southern Idaho, the north-western corner of Utah, the north-western portion of Colorado, the southern and eastern portions of Wyoming, nearly the whole of Montana excluding a western strip, and extends on up into the British Possessions as far as parallel 54° N. The "sub-permanent region" is that which the species frequently invades and in which it can perpetuate itself for several years, but from which it eventually disappears. It includes North-western Colorado, Western Nebraska, and nearly all of Dakota, extending also up into the British Possessions, including the western portion of Manitoba. The "temporary region" embraces that which is only periodically visited and from which the species generally disappears within a year; the extreme northern portion partaking more of a sub-permanent character. It includes Nevada, Utah, Northern Arizona and New Mexico, Idaho, the remainder of Wyoming, Colorado, and Montana, and Texas, Indian Territory, Kansas, Western Missouri, Nebraska, Western Iowa, Minnesota, and the rest of Manitoba. The accompanying map indicates these three regions. The species is essentially a denizen of the high, dry plains and mountain plateaus of the northwestern portion of the United States and the adjacent portion of the British Possessions. At irregular intervals, which the past history of the insect shows to average about every eleven years, it becomes excessively multiplied in this North-west region, and, partly owing to a lack of food, and partly because of instinctive migratory promptings, it rises in the air as soon as it attains maturity and migrates into the more fertile and moister country to the east and south, reaching at times nearly to the Gulf in Texas. The prevailing winds are from the north-west at the period of the year when its wings are acquired, so that its movements are aided thereby. Falling upon the fertile fields of that part of the country indicated as the temporary region, the females permeate the soil with their eggs, which hatch out the ensuing year. It is this progeny of the invading swarms which does most mischief to the young crops, but it is an interesting fact, that has been fully established by recent researches, that this generation is not only more or less diseased and impotent, but that upon acquiring wings it instinctively flies towards the North-west, and in due time vanishes from the invaded country. In other words there is a migration to and an invasion of the temporary region in late summer and fall, and the following year a return migration of the succeeding generation from the temporary region to the country whence its parents came. These two forms of extensive migration are well marked in exceptionally bad locust years, though in the permanent or sub-permanent regions the ordinary migratory habits of the species, covering short distances and in varying directions, may also be observed. The causes of migration have been set forth by Riley in the *Proceedings of the Association for the Advancement of Science* for 1878, the prevailing cause being excessive multiplication and hunger.

1. *Hunger.*—Whenever food is lacking, whether by virtue of excessive drought that is not uncommon in that portion of the country, or through such excessive multiplication of the species that all vegetation is devoured before the insects have completed their life-course, there must needs be the strongest incentive to migrate, as is well known to be the case, under like circumstances, with many animals normally non-migratory.

2. *The Procreative Instinct.*—We may find a sufficient incentive for movement from one place to another during the season of procreation in the well-known salacious habits and ardor of the males. Whenever the insect is excessively abundant the females are greatly disturbed and annoyed during the act of oviposition, as several males will be constantly attending her.

3. *Increase of and Annoyance from Natural Enemies.*—No one who has witnessed the excessive abundance in which some of these natural enemies of the locust at times prevail can for a moment doubt that they often prove a valid cause of migration. The tachina-flies, especially, have been known to follow the locusts in dense swarms, and have been seen so thick that not a locust could rise from the ground without being pursued by several, and there is no escape from their pursuit until the persecuted victim gets high in the air.

4. *Instinctive Impulse.*—As already stated, the principal invading and return movements are aided by the prevailing wind. They are, however, not solely dependent on it. The insects in migrating pursue a definite course, and will move only when the wind favors that course. This is particularly true of the return migration. The fact that there is a well-marked limit line coupled with this return migration is not to the same extent susceptible of any other explanation. The preservation of the species—an instinctive desire to get to a more congenial soil and climate—is evidently the principal inciting cause to this return migration. Hunger can have no part in it, since the insects pass over great stretches of luxuriant vegetation both wild and cultivated.

The life-history of the species may be thus briefly stated: The eggs are laid in the ground in a slightly curved hole bored by the female, chiefly on high, dry ground that is well compacted, and particularly in sandy soil that is rendered firm by the roots of sparse grasses. A mucous matter is secreted which binds the eggs together in a so-called "pod," in which they are so arranged as to allow easy egress for the young locusts. Each pod contains from 25 to 30 eggs, and each female lays from 2 to 4 pods. The eggs hibernate and the young locusts hatch in March in Texas, in late May in Manitoba, and at intervening times in the intermediate country. Five moults are suffered, exclusive of the shedding of the amnion upon hatching. The young are wingless and gregarious, feeding on all sorts of succulent vegetation. With the third moult the rudimentary wings are plainly visible, while with the fourth they become longer and the insect assumes the pupa state. With the fifth moult the wings are fully developed. The average time from the hatching to the acquirement of wings is about 50 days. The species is normally single-brooded, but a second annual generation may be produced, whether by the exceptional hatching of eggs laid by invading swarms or from eggs laid by return swarms that have early matured in southern latitudes; but in either case the second brood either perishes before attaining majority or is harmless. The young locusts travel during the hotter part of the day in immense schools, not in any particular direction, but in search of food. They walk and hop alternately, travelling at the rate of about 3 yards in a minute. Toward evening they go to feeding, and generally collect afterward on fences or other objects away from the ground so as to avoid moisture.

Enemies.—The locust has many natural enemies. In addition to the birds and insectivorous mammals and reptiles there are many species of predaceous beetles and true bugs which feed upon it. The eggs are eaten by the larvæ of *Anthomyia angustifrons*, by the larvæ of certain species of blister-beetles (*Melvidæ*), by the larvæ of certain bee-flies (*Bombiliidæ*), and by a proctotrupid parasite known as *Bænura famelica* (Say.) The larvæ of an asilus fly—*Erax vastardii*—also preys on the eggs, while several of the adult flies of this family feed upon the young locusts. *Proctacanthus milberti* may be especially mentioned as one of the largest and most ferocious species. Parasitic upon the locust itself are several species of tachina-flies, and also several flesh-flies, the commonest species being *Tachina anonyma*, Riley, *Sarcophaga carnaria*, L., and *Calliphora erythrocephala*, Meig. Several ichneumon-flies and an unidentified chalcid also parasitize the adult locust. The locust mite (*Trombidium Locustorum*, Riley), infests the locusts often to a surprising extent. Two hair-worms, *Gordius seta*, Müller, and *Mermis albicans* with its asexual form *M. acuminata*, also extensively infest this species.

Remedies.—Among the very many proposed remedies we may mention a few of the most successful. Harrowing in the autumn or during dry winter weather will break up the egg-masses and cause them to perish. The young or unfledged locusts may be killed (1) by burning the grass late in the spring; (2) by the use of various rolling and crushing machines; (3) by trapping in quail-nets, or by driving into trenches; (4) by the use of some one of the coal-oil pans which have been invented, drawn by one or two horses, and which catch the young locusts and kill them by contact with kerosene. The main idea embodied in these contrivances is that of a shallow receptacle of any convenient size, with high back and sides, either mounted on wheels or runners. The pans are supplied with oil, and the machine is driven over the infested fields, the shafts being manipulated so as to elevate or depress the front edge of the pan as may be desired. The locusts are startled from their places and spring into the oil and die immediately. Against the winged locusts, bagging and catching-machines have been used; they have been driven away by coal-tar, and the growth of crops that mature early is strongly to be advised. Among the preventive measures urged by the commission to the general government as involving a national rather than an individual policy are the following: 1. Encouragement to settlers in the permanent region. 2. Encouragement to the building of railroads. 3. Encouragement of broad schemes of irrigation. 4. Preservation of the forests and encouragement of tree-planting. 5. Judicious burning. 6. Establishment of a permanent system of observations and warnings, utilizing for this purpose military posts and signal stations. 7. Co-operation with the Dominion government.

(C. V. R.)

LOGAN, JAMES (1674–1751), secretary of the colony of Pennsylvania, was born at Lurgan, Ireland, Oct. 20, 1674. He was of Scotch descent, and belonged to the Society of Friends. He was well educated, and became a merchant at Bristol. In 1699 he accompanied William Penn to Pennsylvania as his secretary, and after Penn's return to England he became provincial secretary. He also held the offices of chief-justice and president of the council, and from 1736 to 1738 was acting governor. He died at Stenton, near Philadelphia, Oct. 31, 1751. He published *Experi-*

menta et Melemata de Plantarum Generatione (Leyden, 1739; Eng. trans., London, 1747). His translation of Cicero's *De Senectute* was published by Franklin in 1744. His library, comprising 2000 volumes, and rich in classic authors, forms a separate department of the Philadelphia Library. (See Libraries.)

LOGAN, John Alexander, an American general and statesman, was born in Jackson co., Ill., Feb. 9, 1826. His father, John Logan, was a native of Ireland and a physician. The son attended Shiloh College for a year or two, and served in the Mexican war, becoming quartermaster of his regiment. Elected clerk of Jackson county court in 1849, he attended a course of law lectures at the University of Louisville, and was admitted to the bar in 1852. In the State legislature he served four terms, being then an ardent Democrat, and he was elected to Congress in 1858. He was a follower of Stephen A. Douglas in 1860, and during the secession movement gave his support to the Union cause. The outbreak of the war caused him to resign his seat in Congress. He raised the Thirty-first Illinois regiment, was commissioned colonel, and joined Gen. Grant at Cairo. He was engaged in the battle of Belmont, and at Fort Donelson, in February, 1862, he was wounded. He rejoined his command at Corinth in April with rank of brigadier-general, served in Northern Mississippi, and was promoted major-general in November. In Gen. Grant's Vicksburg campaign he commanded the Seventeenth army corps, and in October, 1863, he succeeded Gen. Sherman in command of the Fifteenth army corps. In the summer of 1864, in front of Atlanta, he had for a short time the command of the Army of the Tennessee. When Pres. Lincoln was a candidate for re-election, Gen. Logan was a prominent speaker in behalf of the Republican party. He rejoined Gen. Sherman's army at Savannah in January, 1865, and continued with it in its march through the Carolinas. He was present at the fight at Bentonville, N. C., the last battle of the war. In August, 1865, he resigned his office in the army with an unimpeachable record for bravery, energy, skill, and success. Gen. Logan afterwards took part in the formation of the Grand Army of the Republic as an organization to preserve among the Union soldiers the feelings of loyalty and fraternity. He was its first commander-in-chief, holding his position from 1866 to 1870. In 1867 he returned to Congress, where he was active in measures for the benefit of soldiers, and prominent in the debates on the reconstruction of the South. In 1868 he was one of the managers of the impeachment of Pres. Johnson. In 1871 he was elected to the U. S. Senate, and was conspicuous as a defender of Gen. Grant's administration. Though he failed of re-election on the expiry of his first term, he was again elected in 1879. In 1880 he was an earnest advocate of the nomination of Gen. Grant for a third term. He was just as active in his efforts to prevent the reversal of the verdict of the court-martial by which Gen. Fitz-John Porter had been dismissed from the service. In 1884, after J. G. Blaine had been nominated by the Republican National Convention for the Presidency, Gen. Logan received the nomination for Vice-President. But in November the Republican ticket was defeated. As Gen. Logan's term as Senator expired in March, 1885, an unprecedented contest ensued in the legislature of Illinois, owing to its nearly equal division between Republicans and Democrats. This contest, however, terminated in May, 1885, in the re-election of Senator Logan.

LOGAN, Sir William Edmond (1798–1875), a Canadian geologist, was born at Montreal, April 23, 1798, being descended from an American loyalist. He graduated at the University of Edinburgh in 1817, and engaged in mercantile pursuits in London. In 1829 he became manager of a coal-mining and copper-smelting enterprise at Swansea, Wales, and investigated thoroughly the geology of that region. His maps were so accurate that they were adopted by the ordnance survey. In 1841 he visited the coal-fields of North America, and communicated the results of his observations to the Geological Society of London. In 1842 he was made head of the geological survey of Canada, and held this post until 1870, making valuable annual reports, and publishing other scientific papers. He also prepared, with the aid of Prof. James Hall (for whom see Encyclopædia Britannica), an elaborate map of North-eastern America. He represented Canada in the great exhibitions at London in 1851 and 1862, and at Paris in 1855, where he was made a knight of the Legion of Honor. He also received the honor of knighthood from Queen Victoria in 1856, and many medals and marks of distinction from learned societies. He endowed the chair of geology in McGill College, Montreal. He died while on a visit to Wales in June, 1875.

LOGANSPORT, a city of Indiana, county-seat of Cass county, is situated at the confluence of the Eel and Wabash Rivers, 75 miles N. by W. of Indianapolis. It is at the crossing of 3 lines of railways, and has a court-house, a normal-school, a State asylum for the insane, 6 hotels, 2 national banks, 4 weekly and 2 daily papers, 17 churches, a good system of public schools, gas and electric lights, a park, and a public water-supply. The city has an extensive trade with the surrounding country, which is highly fertile and well timbered. The town has good water-power, and carries on manufactures of flour, lumber, castings, etc., and is the seat of extensive railroad-shops. It was settled in 1828, and incorporated in 1838. Population in 1870, 8950; in 1880, 11,198.

LONG, Stephen Harriman (1784–1864), an American engineer, was born at Hopkinton, N. H., Dec. 30, 1784. He graduated at Dartmouth College in 1809, and after teaching school entered the U. S. engineer corps in 1814. He was engaged for some years in surveys of the country west of the Mississippi River, as well as of the Upper Mississippi. One of the peaks of the Rocky Mountains bears his name. When the construction of the Baltimore and Ohio Railroad was commenced in 1827, Long, who had then attained the brevet of lieutenant-colonel, was made chief-engineer of its surveys. His improvements of wooden bridges, so as to adapt them for railroad purposes, are noted in Bridges, Vol. I., p. 615. In the construction of railroads he introduced a system of curves in locating roads. He served for some years on the board for the improvement of the Mississippi, and in 1856 was placed in charge of that work. He was made colonel of engineers March 3, 1863, and was retired in June following. He died at Alton, Ill., Sept. 4, 1864. His expedition to the Rocky Mountains was described by Edwin James in 1823, and another, to the Lake of the Woods, by W. H. Keating in 1824. His *Railroad Manual* (1829) was the first work of the kind in America.

LONGFELLOW, Samuel (1819–1884), an American clergyman, brother of the poet, Henry W. Longfellow (see Encyclopædia Britannica), was born at Portland, Me., June 18, 1819. He graduated at Harvard College in 1839, and at its Divinity School in 1846. He became pastor at Fall River, Mass., in 1848, and had charge of the Second Unitarian Church, Brooklyn, from 1853 to 1860. He then went to Europe on account of his health, and on his return settled at Cambridge, Mass. He contributed to the *Radical*, and other periodicals, and published *Hymns of the Spirit*, and some other books for service in Unitarian congregations. He was engaged in preparing his brother's biography when he died

LONG ISLAND. See New York.

LONG ISLAND CITY, a city of New York, one of the seats of justice of Queens county, is on East River, opposite the city of New York, and is separated from Brooklyn by Newtown Creek. It is the main terminus of the Long Island Railroad lines. It was constituted in 1870, and includes the former villages of Hunter's Point, Astoria, Ravenswood, Dutch Kills, and Blissville. Astoria, the N. portion, contains many good residences, and has carpet- and piano-works and other industrial establishments. Hunter's Point is the railroad terminus, and has great oil-refineries and extensive manufacturing interests. Blissville, on Newtown Creek, is the seat of large distilleries, and has manufactures of compressed yeast, fertilizers, etc. The city has an extensive river-frontage, and Newtown Creek is here navigable. The part of the city called Ravenswood contains handsome suburban residences. Long Island City has county and city buildings, numerous churches, public and parochial schools, and several daily and weekly newspapers. Population in 1880, 17,129.

LONGSTREET, Augustus Baldwin (1790–1870), an American educator and author, was born at Augusta, Ga., Sept. 22, 1790. His father, William Longstreet (1760–1814), a native of New Jersey, invented a steamboat, differing from Fulton's, and in 1807 propelled it at the rate of five miles an hour up the Savannah River. He also built steam-cotton-gins. His son Augustus, after being taught at Dr. Waddell's school, graduated at Yale College in 1813. He studied law in Connecticut and was admitted to the bar in Georgia. In 1821 he was elected to the legislature and in 1822 was made circuit judge. He resigned on removing to Augusta soon after. In 1838 he entered the Methodist Episcopal ministry, and in 1839 was made president of Emory College, Oxford, Ga. After nine years' successful administration he was called to the presidency of Centenary College, La., and soon after to the Mississippi University, Oxford, Miss. In 1857 he accepted the presidency of South Carolina College, but he returned to Mississippi University in 1861. Here he died, Sept. 9, 1870. Dr. Longstreet was conspicuous in the controversy which led to the division of the Methodist Episcopal Church. He is best known by his humorous works, *Georgia Scenes* (1840; revised ed., 1867) and *Master William Mitten* (1858).

LONGSTREET, James, an American general, was born in South Carolina in 1820. In his childhood his parents took him to Alabama. He graduated at West Point in 1842, and served as a lieutenant of infantry on the South-west border. He was engaged in the Mexican war, and was severely wounded at Chapultepec. After this war, in which he attained the brevet of major, he remained on duty in Texas until 1858, when he was made paymaster with full rank of major. In June, 1861, he resigned and entered the Confederate service with rank of brigadier-general. He commanded a brigade at Bull Run, and in 1862 was promoted to be major-general. He had command of the rear-guard of the army in its withdrawal from Yorktown towards Richmond, and by his battle at Williamsburg, May 5, 1862, enabled the main army to effect its escape. In the subsequent battles around Richmond, from May 31 to July 1, his division bore the chief part and lost nearly one-half of its numbers. When the Army of Northern Virginia was divided into two corps the commands were assigned to Jackson and Longstreet. The latter contributed materially by his rapid march to the defeat of Pope's army at the second Bull Run. He commanded the right wing at Antietam, and the left at the battle of Fredericksburg. In February, 1863, Longstreet was sent with two of his divisions to operate south of the James River, but after the battle of Chancellorsville, in May, he was recalled. He was now made a lieutenant-general and placed in command of one of the three corps for the invasion of the North. In the battle of Gettysburg, July 1–3, 1863, Longstreet held the right, and part of his corps was engaged on the second and third days of the fight. Although Gen. Lee was driven back into Virginia, he felt strong enough to send Longstreet's corps to the support of Gen. Bragg in the West. His arrival secured for the Confederates the victory at Chickamauga, Sept. 19–20. In November Longstreet was sent against Burnside in East Tennessee, and shut him up in Knoxville. But Grant's success at Chattanooga relieved Burnside also, and in March, 1864, Longstreet hastily returned to Virginia. In the battle of the Wilderness, May 6, 1864, he was severely wounded by his own troops and was disabled for months. In October, when he returned to his command, he had charge of the defences of Richmond north of the James. He assisted Lee in the evacuation of Petersburg, and took part in the last council of war held by Lee, April 8, 1865. After the close of the war Gen. Longstreet, having fully accepted the result of the conflict, was the first Confederate general to renew his allegiance to the government. He resided in New Orleans, engaged in civil pursuits, and used his influence to dispel the animosities of the war. He joined the Republican party, and in 1869 was made surveyor of the port. He was afterwards a school commissioner, but in 1875 he removed to Atlanta, where he was connected with railroads.

LÖNNROT, Elias, a Finnish philologist, was born at Sammati, near Helsingfors, April 19, 1802. He was the son of a tailor, and in 1820 was apprenticed to an apothecary. In 1822 he entered the University of Abo, where he studied philology and natural science. In 1832 he obtained the degree of M. D. at the University of Helsingfors, and afterward practised his profession at Kajana until 1853, when he was made professor of the Finnish language and literature at the University of Helsingfors. He had spent much time in travelling through Finland, collecting the people's songs, proverbs, and tales which had never been reduced to writing. The result of his labors is described under Finland in the Encyclopædia Britannica. The *Kalevala* (1835; revised ed., 1848), or national epic, has been imitated by Longfellow in his *Hiawatha*. Besides this work Dr. Lönnrot collected and published the *Kanteletar* (1841), or lyric poems, about 7000 proverbs and about 2000 riddles. He also prepared a Swedish-Finnish-German dictionary (1847), founded several periodicals, and gave a great impulse to Finnish literature. He died March 19, 1885.

LOOMIS, Elias, an American mathematician, was born in Tolland co., Conn., August 7, 1811. He graduated at Yale College in 1830, and was tutor there, 1833–36. Having been the first American that saw Halley's comet on its return in August, 1835, he published an account of it in the *American Journal of Science*. In 1836 he visited Europe, and at Paris attended the lectures of the most eminent physicists. In 1837 he was made professor of natural philosophy in Western Reserve College; in 1844 he became professor of mathematics in the University of New York; in 1860, professor of natural philosophy and astronomy in Yale College. Throughout his career he made careful observations in astronomy, magnetism, and meteorology with important results. Besides his contributions to scientific journals he has published an excellent series of text-books in pure and applied mathematics and natural philosophy. He also published *Descendants of Joseph Loomis* (1870).

LOPEZ, Narciso (1799–1851). See Cuba.

LORING, William W., an American general, was born in North Carolina in 1815. After fighting in the war of Texan independence he took part in the Florida war of 1836–42, and was a member of the Florida legislature for four years. In 1846 he became a captain of mounted rifles and served under Gen. Scott in the Mexican war. In the assault on the Belen Gate of the city of Mexico, though holding only the rank of major, he led his regiment and lost his left arm by a cannon-shot. In 1849 he protected with his troops the large emigration to California. In 1851, having organized another regiment, he served against the Indians in Texas. In 1856, being now colonel, he marched to New Mexico and afterwards to Utah to assist Gen. A. S. Johnston's expedition. In 1859 he went to Europe, but in 1860 returned to take command of the department of New Mexico. Resigning in 1861, he entered the Confederate service as brigadier-general, served in West Virginia in September, 1862, and afterwards, being made major-general, he commanded a division of Johnston's army in the attempt to relieve Vicksburg in 1863. He was with Gen. Bragg at Chattanooga and in the following campaign. At the close of the war he went abroad, and in 1869 he became inspector-general of the Egyptian army. Afterwards he had command of the coast of Egypt, and in the expedition to Abyssinia in 1875–76 he was second in command and chief-of-staff of the army. For his services he received several distinguished marks of honor. In 1879 he returned to the United States.

LORNE, Sir John George Edward Henry Douglas Sutherland Campbell, Marquis of, an English statesman, was born at London, Aug. 6, 1845. He is the eldest son of the Duke of Argyll, and married, March 21, 1871, the Princess Louise, fourth daughter of Queen Victoria. He represented Argyllshire in Parliament from 1868 to 1878, and then was appointed governor-general of Canada, which position he held with great acceptance until 1884. He has published a poem, *Guido and Lita* (1875), and *The Psalms literally rendered in Verse* (1877).

LOS ANGELES, a city of California, county-seat of Los Angeles county, is the chief town of the southern part of the State. It stands on a river of the same name, 9 miles from the sea, and is 20 miles N. of Wilmington, its port. It is in 34° 5′ N. lat., 118° 18′ W. long. It was founded by Spanish missionaries in 1771; was incorporated as a city in 1850. Its limits include an area of 6 square miles, a part of which space is occupied by handsome gardens and vineyards. The old adobe structures of the Mexican quarter are fast giving way to buildings in modern style. The city contains the county buildings, a city-hall, 2 national, 2 State, and 2 savings banks, and has 1 monthly, 3 daily, and 11 weekly newspapers, of which one each are issued in the German, Basque, Spanish, and French languages.

Of the University of Southern California only the medical school and the dispensary are in operation. The city is on the Southern Pacific Railroad, at the junction of 4 branch lines, and trains of the Atlantic and Pacific Railroad enter the town. Among the numerous churches is the cathedral of the Roman Catholic bishop. The city has horse- and cable-cars, gas- and electric-lights, and 3 systems of water supply, 1 of them private. It is the seat of a large trade in oranges, wines, raisins, and the other products of Southern California. It is a noted winter and health resort, and enjoys a delightful climate. Although not prominent as a manufacturing town, it has a large number of industrial establishments. Among the leading manufactures is that of water-pipes for irrigation works. Valuation in 1885, $16,300,000. Population in 1870, 5728; in 1880, 11,183.

LOSSING, Benson John, an American historian, was born at Beekman, Dutchess co., N. Y., Feb. 12, 1813. In his youth he was a watchmaker, but in 1835 became a journalist, and in 1838 learned also wood-engraving. He then edited some magazines, and prepared several illustrated works, among which are an *Outline History of the Fine Arts* (1841); *Lives of the Signers of the Declaration of Independence* (1848); *Pictorial Field-Book of the Revolution* (1850–52). The last is the result of journeys to every place of note in connection with the American war of independence. Its popularity caused the author afterwards to prepare in the same way the *Pictorial Field-Book of the War of* 1812 (1868). He has also published *History of the United States* (1854–56); *The Civil War in America* (3 vols., 1865–68); several biographies of distinguished Americans, and a *Cyclopædia of United States History* (2 vols., 1881).

See Vol. XV. p. 12 Am. ed. (p. 11 Edin. ed.).

LOTTERIES. Where a pecuniary consideration is paid, and it is determined by lot or chance, according to some scheme held out to the public, what and how much he who pays the money is to have for it, that is a lottery (Wilkinson *vs.* Gill, 74 *N. Y.*, 63). A game where a person paying money, or other thing of value, becomes entitled to money, or some other valuable thing, or contingencies to be determined by lot, and cast by the managers of the game, it implies some division of property by chance (Bishop's *State Crimes*, § 952). The highest court of Tennessee has declared "lotteries gambling and odious gambling" (State *vs.* Smith & Lane, 2 *Yer. R.*, Tenn.). The Supreme Court of the United States in 1880 declared, "That lotteries are demoralizing in their effects, no matter how carefully regulated, cannot in the opinion of this court be doubted. They are a species of gambling, and wrong in their influences. They disturb the checks and balances of a well-ordered community. Society built on such foundations would, almost of necessity, bring forth a population of speculators and gamblers, living on the expectation of what chance might award them from the accumulations of others" (J. R. Stone *et al. vs.* State of Miss., 11 *Otto*). Chief-Justice Lindsay, of Kentucky, in 1878, held that lottery grants are against common right and the general policy of law (Com. *vs.* City of Frankfort, 13 *Buch.*).

In 1699 a body of ministers in Boston denounced lotteries as "cheats," and the managers as "pillagers of the people." The general assembly of Kentucky in 1816 denounces lotteries as injurious to the good citizens of the commonwealth and productive of extensive evils (*Acts*, 1816, Vol. II., p. 1150).

The following States prohibit all lotteries in their constitutions, and those in italics prohibit gift enterprises as well: Alabama (1875); Arkansas (1836); California (1849); *Colorado* (1876); Florida (1868); Georgia (1868); *Illinois* (1845, 1875); Indiana (1851); Iowa (1846, 1857); *Kansas* (1855, 1858); Louisiana (1845, 1852, but in 1864 power was given the general assembly to license lotteries, provided not less than $10,000 per annum tax was paid by each vendor. In 1879 they were again prohibited, and the general assembly was required to enact penal statutes against the same); Maryland (1851, 1864, 1867); Michigan (1835); Minnesota (1857); Mississippi (1864); *Missouri* (1865, 1875); *Nebraska* (1866, 1875); Nevada (1864); New Jersey (1844); New York (1821, 1846); Ohio (1851); Oregon (1857); Rhode Island (1842); South Carolina (1868); *Tennessee* (1834, 1870); *Texas* (1866, 1868, 1876). Texas' charter prohibits all "lotteries, gift enterprises, or other evasions of lot principles established or existing in other States." Virginia (1850, 1864, 1870); *West Virginia* (1861, 1863); *Wisconsin* (1848); West Virginia embraces also "gift enterprises at church fairs and festivals." Virginia includes "raffles." All these States have stringent laws besides; and most constitutions require legislatures to enact laws to prohibit all lotteries, etc.

The code of Arizona Territory (*Bill of Rights*, p. 228, 1864) forbids the legislature from authorizing any lottery within that Territory. Connecticut in 1728 prohibited all lotteries under a penalty of not more than $100 fine, nor less than $20, or imprisonment of not more than one year, or less than 60 days (Revision, 1875, p. 516). Dakota defines a lottery the same as Utah, and then declares them a "common public nuisance," and provides a penalty not to exceed one year's imprisonment and $2500 fine (*Code*, Vol. II., pp. 1196–97, 1884). The laws of Dakota and New York are almost identical. Delaware prohibits the selling of lottery tickets, except under a license of $300 per year (*Revised Code*, p. 255).

Kentucky in 1878 passed an act repealing all acts containing any grant of a lottery privilege or franchise (*G. S.*, Chap. xlvii., p. 950, 1881). A similar act passed in 1852, to take effect 1856, was held by the court of appeals of that State to be unconstitutional

(Chief-Justice Lindsay and Cofer dissenting), holding the legislature could not divest vested rights. The dissenting opinion has since been sustained by the U. S. Supreme Court.

Maine prohibits all lotteries, declares them a nuisance, especially mentioning "those in the interest of churches, benevolent objects, or otherwise" (*R. S.*, p. 924, § 3, 1883). Massachusetts provides a penalty of $2000 for each offence (*Laws*, 1869, c. 112). New Hampshire declares against all lotteries and gift enterprises; then adds, "If any person shall sell any article or thing, the purchaser expecting by reason of any declaration, publication, or course of business, or any one having any connection with the same, that he will receive some other thing in addition, he shall be fined not exceeding $100" (*G. L. C.*, 272, § 5). North Carolina forbids lotteries under a penalty not to exceed six months' imprisonment and $2000 fine (*R. S. C.*, 32, § 69). Pennsylvania enacts that all lotteries, whether public or private, are a common nuisance, and imposes a penalty of not to exceed $1000 fine, and imprisonment at solitary confinement at labor of one year (*Brightly's Purdon's Digest*, Vol. I., p. 518).

Utah defines a lottery as follows: "A lottery is any scheme for the disposal or disposition of property by chance among persons who have paid, or promised to pay, any valuable consideration for the chance of obtaining such property, or a portion of it, or for any share or any interest in such property upon any agreement, understanding, or expectation that it is to be distributed, or disposed of by lot or chance, whether called a lottery, raffle, gift enterprise, or by whatever name the same may be known;" then forbids it (*Compiled Laws*, 1876, c. 9., p. 614). Vermont laws include all lotteries and the disposing of property by chance (*R. S.*, c. 202., p. 824). In Washington Territory a fine not to exceed $5000 is imposed upon lotteries (*Code*, 1873, c. 6., § 110). Wyoming Territory prohibits all "lotteries, gift enterprises, or schemes of any character, whereby prizes, premiums, or any thing, or representative of value, are offered, advertised, or represented to be drawn, paid, given, or distributed by chance," except the party so engaging pay a quarter-yearly license of $100. No license for less than three months (*Comp. Laws*, 1876, c. 76, § 13).

Lotteries are of Italian origin, the first one being in Florence in 1530. France legalized them in 1539. The first lottery for money was in 1630. France passed laws suppressing them in 1793 and 1836; yet, in 1879, 12,000,000 national lottery-tickets of 1 franc each were sold at Paris to pay for prizes to exhibitors, and the wages of workmen of the exposition of 1878. In England the first lottery referred to in history was one of 40,000 "lots" at 10 shillings each, in 1569, which was drawn at the west door of St. Paul's Cathedral, the profits of which went for the repairing of the harbor. In 1611–12, in the third charter of Virginia by King James, was a grant to "The Treasurer and Company of Adventurers and Planters of the City of London, for the first Colony of Virginia," of one or more lotteries to run for one year; then, only at the pleasure of the king. For carrying on the war with France in 1696–97, and for necessary household expenses of the royal family, an act of Parliament was passed taxing "malt, mum, sweets, cyder, and perry," and then chartered the first authorized lottery to raise £1,400,000 more for the same purpose. This act provided for the appointment of managers, required them each to give bonds in £10 for faithful performance of their duty, and designated with great particularity how tickets should be issued, drawings made, and prizes paid. Tickets were issued in four parts: one to be delivered to the purchaser, one to be filed with the treasury, one to be put in the wheel, and the other to be kept on file by the managers. Every safeguard was thrown around the scheme to prevent fraud or default on the part of the managers.

Two years later (10 Will. III., c. 23), 1698–99. Parliament declared against all lotteries, saying in the preamble of the act of their managers: "have thereby most unjustly and fraudulently got to themselves great sums of money from the children and servants." Then enacts as follows, to wit: "are common and public nuisances; and that all grants, patents, and licenses for such lotteries, or any other lotteries, are void and against law. . . . That after Dec. 29, 1699, no lottery should exist under a penalty of £500 for each offence; that any person may inform and sue for said penalties. . . . Said parties shall likewise be prosecuted as common rogues."

The true character of lottery management in the United States may be seen in the history of a few of the so-called lotteries of modern days. In 1838 a charter was granted E. H. Taylor and others, trustees of the town of Frankfort, Ky., to raise by lottery, in one or more classes, a sum not to succeed $100,000, to be appropriated one-half to the city schools in the town of Frankfort and the other half for the construction of water-works from the Cove spring into said town (*Acts* 1837–38, p. 126). This lottery was called "The Kentucky State Lottery," and the managers were required to give bonds in the sum of $100,000 for the faithful discharge of duties imposed upon them. It consisted of over 12,000 classes. An act of 1838–39 allowed the managers to sell this lottery scheme, and to take a bond from the parties purchasing to faithfully comply with the requirements of this act (*Acts* 1838–39, p. 191). This amount was raised, and the lottery ceased for many years, after exhausting 7898 classes. In 1869 a shrewd movement secured from the general assembly an act conferring on the board of councilmen of the city of Frankfort "the same franchises, powers, and authority as was conferred on the managers in the act of 1838;" nothing additional thereto (*Acts* 1869, vol. i., p. 489, § 18). Three years afterwards another act was secured from unsuspecting lawmakers, by which it was provided that the board of councilmen of the city of Frankfort might sell or convey the property, or parts thereof, belonging to the said city of Frankfort, goods, chattels, or franchises, on such terms, and for such sums, as said board deemed to the best interest of the city (*Acts* of 1872). Dec. 31, 1875, they entered into a contract with one E. B. Stewart, and sold to him the said franchises at the agreed sum of $100,000, to be paid in instalments. The schemes of 1838–39 were embodied in this contract. April 19, 1876, Stewart sold 20 classes to one Pepper. Pepper drew one class as the "Kentucky Cash Distribution Company." Stewart transferred other classes to one Owen Stewart and others; then transferred the remaining interests to one John P. Joice, who in turn sold to Simmons & Dickinson. The 20 classes to Pepper were afterwards transferred to G. W. Barrows & Co., who for years drew the "Commonwealth Cash Distribution Company," with offices in New York city, and continued to sell tickets of this lottery long after their 20 classes were exhausted, until stopped by the New York Society for the Suppression of Vice. This scheme was also further fraudulent, being a single-numbered lottery, while the grant was on the ternary plan (13 *Bush*, p. 345). July 30, 1877, the city of Frankfort, exercising the discretion which they claimed was reserved in the contract with Stewart, declared the contract cancelled, and Aug. 2, 1877, resold said grant to Murray, Miller & Co. This will explain to many victims of the "Kentucky State Lottery, Murray, Miller & Co., managers," and the "Frankfort Lottery, Simmons & Dickinson, managers," how two genuine Kentucky lotteries could exist at one time. The general assembly, in 1868, repealed all lottery grants and franchises. The court of appeals of the State of Kentucky, in 1877, held that the Frankfort lottery privileges were exhausted, and that the subsequent legislation of 1869 granted no further immunities and privileges than were taken and could be enjoyed by the grantees themselves under the original act; that when the net profits reached $100,000 the grant was completely exhausted. As the original grantees exhausted the grant of 1838, there could be, in fact, no grant under either of these statutes under which these notorious public plunderers operated, and continue so to do (Commonwealth *vs.* City of Frankfort, 13 *Bush*, p. 185). Another lottery, operated as "The Kentucky State Lottery," for the University of Paducah, was also declared by the court of appeals as illegal (Commonwealth *vs.* Bull, 13 *Bush*, 659). The act of 1852 being constitutional, there have been no legal lotteries in the State of Kentucky since that act went into force in 1856.

In 1877 a man named Pattee, and his brother-in-law, Read, operated what they chose to call the "Cheyenne Lottery of Wyoming," tickets $2 each, or 10 for $10. "No blanks; every ticket wins a prize." "$722,268 in cash prizes." "One grand cash prize of $100." They would send out packages of 10 tickets to names which they had, or could obtain, offering to allow the recipients to retain them on the payment of half-price, the balance to be deducted from the prizes the tickets were sure to win. These tickets were sent out under the name of Read & Co., Emery & Co., Penn & Co., H. J. Long & Co., of New York, Tiffany & Read, of Riverside, N. J., and Read & Co., of New Haven, Conn. The money received for these tickets went to enrich the backer of the scheme—sheer robbery, as there were no drawings and no prizes. After the New York Society for the Suppression of Vice had suppressed the "Cheyenne," then came the "First Grand Public Cash Distribution at Victoria, Canada, Tiffany & Read, agents." This was followed by "Laramie City" and "Wyoming" lotteries; then came "Royal Havana Lottery, Read & Co., agents, New Haven." In the latter they counterfeited Havana Lottery tickets. Read was the resident partner at New Haven to secure the mail; he forwarded his orders to 5 Beekman Street, New York, daily, where two young lady clerks filled them. In this office all the dies, plates, water-marked paper, etc., for printing their bogus tickets were seized, and also 300,000 names and post-office addresses, to which they mailed their circulars and tickets, on the Cheyenne plan of distribution. After the seizure the principals fled to Canada, and uttered a similar scheme, as Hugh McKay & Co., of St. Stephens, New Brunswick, called "Royal Gift Soiree." Being exposed there, they changed to "Royal New Brunswick Gift Soiree," and "The Royal Quarterly Gift Soiree." In 1884 they were dislodged at St. Stephens. Before leaving the United States these enterprising frauds issued another scheme, in which it appeared from their circulars that the Laramie City and Topeka (Kan.) lotteries had resulted in the recipients of their circulars drawing a gold watch and chain valued at $200. An assessment of 10 per cent. by the committee having the disposal of said prizes in charge was required to secure the prizes. The prize to be shipped only on receipt of $20. As these certificates in due form were sent out to those who had invested, great numbers, believing they actually had drawn these prizes, forwarded their money, to be robbed of the same, or to get in return a box of—sawdust.

The Louisiana Lottery is now in full operation, claiming to sell $6,000,000 worth of tickets annually. It was chartered in 1868, and the preamble and charter proclaim it as substituted in the place of other public plunderers. It says: "Whereas many millions of dollars have been withdrawn from and lost to this State by the sale of Havana, Kentucky, and Madrid and other lottery tickets, etc." Then says Art. II., sec. 2, "The objects and purposes of this corporation are—first, the protection of the State against the great losses heretofore incurred by sending large amounts of money to other States and foreign countries for the purchase of lottery tickets." This act prohibits all other lotteries from selling tickets in that State under a penalty of fine and imprisonment. The general assembly of Louisiana, March 28, 1879, repealed this charter, to wit: "Sec. 2. Be it further enacted, etc., that the Louisiana State Lottery Company be and the same is hereby abolished and prohibited from drawing any and all lotteries, or selling lottery tickets either in its corporate capacity or through its officers, directors, stockholders, members, or agents directly or indirectly" (*Laws* of 1879). It is claimed that the repealing act was unconstitutional, and that the constitution, adopted by the State of Louisiana, December, 1879, revived and perpetuated the charter. The Supreme Court of the United States, May 10, 1880, however, in the case of John B. Stone *et al. vs.* State of Mississippi, where the question of the unconstitutionality of a repealing act was involved, says: "That, although the lottery company was duly chartered, the legislature which granted that charter had no authority to bargain away the police power of the State, in the regulation of all matters affecting the public health and public morals. . . . Any one, therefore, who accepts a lottery charter does so with the implied understanding that the people, in their sovereign capacity and through their properly constituted authorities, may take it back at any time when the public good shall require, and this whether it be paid for or not."

The average receipts of a branch office of this lottery, formerly at 212 Broadway, New York city, in 1880, before it was driven out of New York, were 1760 letters ordering tickets, and $5176 daily. They have been known to receive over 550 registered letters, at a single delivery, at the New York post-office. Counsel representing this company, in July, 1884, offered the chief agent of the New York Society for the Suppression of Vice $25,000 in cash annually, the first payment to be made within 48 hours, if that society would consent to his lottery having an office in New York city, and promise not to interfere with the same. This last lottery, in a circular issued August, 1883, claims to have paid $4,881,060 in prizes, from Jan. 1, 1879, to Aug. 1, 1883. According to their circulars they sell $6,000,000 worth of tickets annually, to wit: 100,000 tickets monthly, at $5 each; so that during the four years and seven months, according to their own showing, they have taken in $27,500,000. In considering the sum of prizes paid weight must be given to this very important fact, that this is simply the sum total of the lists representing the drawings in their lottery; and, also, great weight must be attached to the fact that the tickets which remain on hand in their possession are in the drawing; and if 25,000 tickets are left over the Louisiana Lottery Company has 25,000 chances, or whatever the number may be, in the wheel to the poor man's one.

All these lotteries for years had opened head-quarters in New York city, on Broadway. In some of these places uniformed policemen could be seen in open day keeping the line of ticket-buyers in order, while the law was openly violated. These lotteries advertised extensively in nearly all of the daily and weekly papers published in the city and State of New York, and continued so to do down to 1880 and 1881; one journal in the city of New York having over $500 a day advertising from these lotteries. The New York Society for the Suppression of Vice assailed these evils first in 1877. Down to 1881 scarcely a case could be brought to trial in the State courts. In 1885 every office was closed and the advertising had ceased in New York.

With the constitutions of 29 States, and laws in every State including that of Louisiana, against these schemes, they exist, a public nuisance, a scourge to the poor, a temptation to the weak, and demoralizing to the States which gave them birth. With their questionable legality their managers arrogantly demand open mails and the right to set up their offices for the sale of their tickets in every State in the Union.

(A. C.)

LOTUS. Botanically the title Lotus is given to a genus of leguminous plants, nearly related to the clovers. The most common species, *L. corniculatus*, is an ordinary plant of Northern Europe, known in England as birds-foot trefoil, and considered a valuable addition to pasture grasses. There are several other plants commonly known as lotus, with the idea that they were the plant referred to in Homer's description of the *Lotophagi*, or for other reasons. The *Zizyphus lotus* of Barbary, a kind of jujube tree, whose fruit tastes like dates, and is much used as food, is supposed by many to have been the Homeric plant, of which all who ate forgot their native land, and lost all desire to return, but preferred to remain and eat of the entrancing food. The fragrant blue and white water lilies of the Nile, *Nymphœa cœrulea* and *N. lotus*, have been given the same name. They were worshipped by the ancient Egyptians. The stalks and roots are eaten. *Nelumbium speciosum*, the sacred Egyptian bean, is another sacred water lily, which is honored as a mystical plant also in China and India. It is the "lotus flower" of India. The seeds and roots are eaten. A closely similar American species, *N. luteum*, known as the water chinquapin, has been called lotus by American writers. Its seeds and roots are edible, and if cultivated it might be made a valuable food-plant. There are several other species of plants, of less importance, to which the name lotus has been applied. (C. M.)

LOUDON, John Claudius (1783–1843), a Scotch horticulturist, was born at Cambuslang, April 8, 1783. He was educated at Edinburgh, and in 1803 went to London, where he became a landscape-gardener. In 1806 he began to give practical instruction in agriculture near London, and afterwards in Oxfordshire. In 1812 he went abroad, visiting Germany and Russia, but in 1814 returned to landscape-gardening. He also visited France and Italy in 1819. He began to publish his encyclopædias in 1822, the first being the *Encyclopædia of Gardening*, then the *Encyclopædia of Agriculture* (1825); the *Encyclopædia of Plants* (1829); the *Encyclopædia of Cottage, Farm, and Villa Architecture* (1832). He also edited several magazines on similar subjects. His *Arboretum et Fruticetum Britannicum* (1838), being an account of all the trees and shrubs of Great Britain, proved too costly for his means. In his later years he lost the use of his hands, yet he continued to edit his various publications. He died at London, Dec. 14, 1843.

His wife, **Jane Loudon** (1808–1858), assisted her husband in many of his works, and also published *Gardening for Ladies* (1840) and *British Wild Flowers* (1846).

LOUISBURG, a small town on the S. E. coast of Cape Breton Island, of interest from the prominent part it played in the eighteenth century wars between France and England. It was first settled by French emigrants from Nova Scotia, after the surrender of this province to England by the Peace of Utrecht (1713). Its name was given in honor of Louis XIV., and the French determined to make it a powerful fortress, as it possessed an excellent harbor, and was well situated for the protection of their interests in America. Very strong and extensive stone fortifications were built, the work being continued for thirty years, and costing over $5,000,000. The town was well built, of 2½ miles in circumference, and had 3000 inhabitants. During the war between France and England, which broke out in 1744, the New England colonists determined to attack this fortress, which menaced their fisheries by sheltering the French privateers. A colonial force of about 4000 men under William Pepperell, a merchant of Kittery, was sent against it. The place was defended by 1600 men. The siege began on May 11, 1745, and the place surrendered on June 28, the garrison being discouraged by the capture by the English fleet of a large French man-of-war, with stores and reinforcements. There was great rejoicing in America and England over this capture, yet the town was restored to France in 1748, by the peace of Aix-la-Chapelle.

In 1757, during the French and Indian war, Lord Loudon collected a powerful force to attack Louisburg, but gave up the project on learning that it had been heavily garrisoned by the French. In the succeeding year an expedition under Gen. Amherst, consisting of 38 men-of-war and 12,000 troops, sailed against Louisburg, then garrisoned by 3100 men. The attack was made on the land side, the landing being made on the 8th of June. Soon after, Gen. Wolfe, the subsequent hero of Quebec, captured a detached post, and erected there a strong battery. Batteries were also erected on the opposite side of the town. The post was obstinately defended, but after nearly two months' siege, in which the French fleet was destroyed, and several breaches made in the walls, the town surrendered, the garrison becoming prisoners of war. The town was a heap of ruins. The fortifications were soon after demolished by the British government; 5637 prisoners were sent to England. Since that date the island has remained in the hands of the English, but Louisburg has lost all its importance, it having at present about 300 inhabitants, mostly fishermen. Scarcely a trace of its once powerful fortifications now exists.

LOUISIANA, part of the territory purchased from France under this name in 1803, was admitted into the Union in 1812. The State contains 41,346 square miles, and is nearly evenly divided between flat lands and hills or uplands, the latter reaching their highest point, 484 feet above the level of the sea, in Claiborne parish. Its physical divisions are: coast marsh, subject to tidal flow, 3,500,000 acres; the low pine flats, 1,500,000; wooded alluvial swamp, flooded by the rivers but reclaimable with a good system of levees, 2,750,000; arable lands, 3,500,000; prairie land, 1,500,000; bluff lands, 5,500,000; pine hills, 5,500,000; good oak uplands, 5,250,000. The sea marsh extends inland 25 to 30 miles along the Gulf coast; the cultivated lands in that section being along the banks of the streams emptying into the Gulf, which are higher than the rest of the country, and on the so-called islands or hills which rise in the centre of the marsh. There are also scattered through the marsh a number of *chênières*, or oak groves, rising from mounds of shells and capable of cultivation. The marsh is subject to overflow in consequence of tornadoes and winds blowing from the south; the highest point on the Gulf coast, Isle Derniere, or Last Island, having been completely submerged in a storm in 1858, and nearly all the people on it drowned. The marsh offers good pasture for hogs and cattle. In 1880 two large enterprises were inaugurated, looking to the redemption of this marsh for purposes of cultivation—the Louisiana Improvement Company, commencing operations in St. Mary and Terrebonne, and the Watkins Company, in Calcasieu and Cameron. Considerable land has been recovered and drained, and has been found exceedingly fertile, and specially adapted to the cultivation of rice, but too raw for sugar. The companies are recovering from 5000 to 10,000 acres of land per year, much of which is already under cultivation. The alluvial lands include those lying along the Mississippi, Red, Ouachita, and Sabine Rivers. The Mississippi bottoms are from 35 to 60 miles wide; those of the Red, 10 to 20. The front lands are the highest and most cultivated, the country sloping back into swamps, which are covered with water a considerable portion of the year. Much of this back land, however, is adapted to the production of rice, and is planted in that crop. The prairies in the south-west-

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ern portion of the State are covered with abundant grass, and intersected by *coulées* or small streams, bordered with timber and *marais*, or swamps, fringed with tall rank grass. They support large herds of cattle and horses. Much of this prairie land has been lately brought under cultivation, and it does equally well in cotton, cane, or corn, the land improving with cultivation. There are two borders of pine lands, the smaller in the eastern portion of the State, and extending south from the Mississippi line to Lake Pontchartrain; the other occupying Central Louisiana, and divided into two sections by the valley of the Red. The uplands and the bluffs include a small section east of the Mississippi, and all Northern and North-eastern Louisiana, not included in the Mississippi, Red, and Ouachita bottoms. Louisiana has the largest extent of navigable waters of any State in the American Union. Among the leading rivers are the following: the Mississippi, with 585 miles of navigation within the State; Red, 510; Sabine, 387; Lafourche Bayou (a French-Indian word used in Louisiana to designate a smaller or tributary stream), 1318; Ouachita, 218; Atchafalaya, 217; Bayou Maçon, 138; Calcasieu, 132; Black, 126; Bayou Tensas, 112; Pearl, 103; and 34 other smaller streams, making a total river navigation of 3782 miles. There are several large interior navigable lakes, as Pontchartrain, Borgne, Grand, Bestineau, Bodeau, Cross, and others, leaving no portion of the State, except the northern quarter, more than 20 miles distant from navigable water. Most of the streams in Southern Louisiana are higher in high water than the lands fronting on them, the latter being protected from inundation by a system of dykes called levees, from 4 to 18 feet in height; the land slopes back from the river and drains into the swamp. When the levees break from the force of the water, crevasses are caused and the land is overflowed, great damage being caused thereby.

Climate.—The climate of Louisiana is semi-tropical. In the northern portion snow falls, but in New Orleans and Southern Louisiana it is seen only once in 10 years, and melts almost immediately. In the sugar districts light freezes come once in three years, but the ice seldom remains more than a few hours. The average winter temperature for New Orleans and the southern half of the State is 57.16° Fahr.; for summer 82.28°; mean for the year 69.54°. Rainfall, 72.81 inches. In Shreveport, in the extreme northern portion of the State, the mean for the year is 63.96°; rainfall, 47.20 inches. The temperature is much affected by the large bodies of water in the State which mitigate the cold, the oranges or cane being frequently frozen on one side of a stream and escaping all harm on the other. Protracted droughts are almost unknown, and the growing season is very long, two crops of corn, sorghum, rice, and jute being frequently grown on the same ground, and three cuttings of tobacco obtained. In the prairie regions of the west, where large numbers of cattle and horses are raised, they are seldom if ever housed during the winter. The health of the State, particularly in the cities, has been improving with better sanitary methods. The death-rate of New Orleans has steadily decreased from 59.13 per thousand in 1850–59 to 40.23 in 1860–69; 35.04 in 1870–79, and 28.93 in 1880–86. The death-rate of the negroes is 56 per cent. greater than that of the whites, largely due to their neglect of all sanitary precautions. The causes of the greatest mortality are: consumption, 15 per cent.; malarial fevers, 7; diarrhœal diseases, 5.

Geology.—An artesian well sunk in New Orleans in 1886 went 1000 feet through post-tertiary deposits, through layers of clays, sands, and small shells. The trunks of trees, in a good state of preservation, were struck at the depth of 820 feet, and at the same depth seed was obtained which germinated. The mineral productions of the State were generally regarded as of small importance until within the last few years, when valuable discoveries have been made. At Petit Anse, in Iberia parish, on a so-called island or hill rising in the midst of the marsh, is the Avery salt-mine, discovered during the war, and furnishing rock-salt, nearly pure. Salt is also obtained from wells and ponds in Winn, Catahoula, Natchitoches, and Grant parishes. In the southern portion of the State, in Calcasieu, valuable deposits of sulphur have been discovered, though not yet utilized on account of quicksands. Petroleum has also been found near the sulphur-mine. Lignite coal is mined to a small extent in Sabine and DeSoto, and gypsum and marl obtained in a number of parishes. The first geological survey of the State, made in 1885, showed large quantities of valuable hematite iron ore in Webster, Claiborne, Lincoln, Bienville, and Bossier.

Timber.—Louisiana is densely wooded except in the swamps and prairies, 16,608,800 acres or three-fifths of its area being in forests. Pine is the most important merchantable timber, the quantity available being estimated at 48,203,000,000 feet. Along the Atchafalaya and in the swamps back of the Mississippi are large bodies of valuable cypress, averaging 6000 feet to the acre, and containing in all about 10,000,000,000 feet of timber. Along the Gulf coast and on the bayous falling into the Gulf are a number of *chênières* or groves of live-oaks. On account of the excellence of this timber for ship-building several tracts have been reserved by the United States for the repair of the navy. The other principal woods are oak of various kinds, cotton-wood, tupelo, gum, ash, walnut, magnolia, poplar, and hickory.

Crops.—The soil of the State differs greatly in fertility and in the crops it will produce. That of the alluvial lands, black, dark-red, and reddish-gray, is as fertile as any in the world; the prairie section improves with use; the pine lands are thin, sandy, and poor, the small bottoms being good; the bluff region is very fertile; while the bottoms in the uplands also produce well. All the fruits of the temperate zone and some few of those of the tropics thrive. The orange is the most important horticultural production of the State, averaging $750,000 in value per year. Figs are also abundant, and there are some few banana groves in the southern district. The peach, quince, and plum grow throughout the State, and the apple does well in Northern Louisiana.

The staple crops are cotton, sugar, rice, and Indian corn. Cotton is cultivated in 51 parishes out of 58 in the State; it grows best in the alluvial district along the Mississippi above the Red River. East Carroll produces the largest yield of cotton to the acre (.95 of a bale) of any county in the United States or district in the world, and is the centre of maximum production. One-sixth of all the land in the parish is planted in this crop. Of the land under cultivation 34.9 per cent. is in cotton, but only 3 per cent. of the State's total acreage. The cotton crop of 1879 was 508,569 bales. For recent years it has been as follows:

1880	527,500 bales.	1883	560,200 bales.
1881	560,000 "	1884	500,000 "
1882	440,000 "	1885	463,000 "

Sugar-cane grows in 23 parishes. The production has fallen off since the war, but the quality has greatly improved, and now half the sugar manufactured is of refined and clarified, the other half being brown sugar. The crops since the census have been:

	Sugar. Hhds.	Sugar. Pounds.	Molasses. Gallons.
1880	218,314	272,982,899	15,255,030
1881	122,982	159,874,950	9,691,104
1882	241,220	303,066,858	15,716,755
1883	221,515	277,925,674	15,523,600
1884	170,431	211,402 963	11,761,608
1885	209,684	251,620,800	14,483,000

There has been a large increase in the rice crop of late years, land formerly cultivated in sugar being planted in rice. The late crops have been :

	Barrels.	Pounds.
1880–81	266,658	61,331,134
1881–82	240,966	55,422,180
1882–83	187,217	45,050,960
1883–84	195,348	40,813,740
1884–85	173,029	39,796,772
1885–86	325,000	74,750,000

The greater portion of this crop is produced in the Mississippi River parishes below New Orleans, principally in Plaquemine, on the Lafourche, and in St. Mary and Calcasieu.

The land in corn averages 960,000 acres, and the crop 9,000,000 bushels. Other products are, tobacco—the Perique of St. James being produced nowhere else in the world—early vegetables, now raised in large quantities for the Northern markets, oats, and sweet potatoes. The total value of all the agricultural products of the State was $42,883,522 in 1879, $49,626,000 in 1880, $40,987,200 in 1881, $50,663,000 in 1882, $53,421,000 in 1883, $48,770,000 in 1884, and $49,865,000 in 1885. The total acreage under cultivation in 1879 was 2,739,972 ; 864,787 in cotton, 742,728 in corn, and 181,592 in cane. The live-stock include 115,620 horses ; 81,382 mules and asses ; 161,820 milch-cows ; 290,668 oxen and other cattle ; 124,600 sheep ; and 628,890 hogs ; total value, $22,416,650.

Manufactures.—There are few manufactures outside of New Orleans. In 1880 there were 1553 factories, employing 12,164 hands, with a capital of $11,462,468, and turning out products of $24,265,183. In 1885 the establishments were 2105 ; hands employed, 16,970 ; capital invested, $16,140,000 ; products, $32,165,000. The chief manufactures are cotton-seed oil, production, $3,739,000 ; lumber, $1,767,640 ; rice-cleaning, $1,573,281 ; foundry and machine-shops, $1,554,485 ; and sugar-refining, $1,483,000.

Railroads.—The railroad mileage is 1286, divided among the following lines : Baton Rouge and Grosse Tête (Louisiana Central), 26 miles, from Baton Rouge to Lombard ; Illinois Central, from New Orleans to Cairo, 93 miles in the State ; Clinton and Port Hudson, 21½ miles ; Southern Pacific, from New Orleans to San Francisco, with branch from Lafayette to Alexandria, 245 miles in State ; Louisville and Nashville, 38 miles in State ; Texas Pacific, 336 miles in State, from New Orleans to Marshall ; Mississippi, Terre aux Bœufs, and Lake Road, from New Orleans to Shell Beach, 28 miles ; Cincinnati, New Orleans, and Texas (Queen and Crescent), from New Orleans to Meridian, Miss., 43 miles in State ; Vicksburg, Shreveport, and Pacific, 134 miles in State ; Louisville, New Orleans, and Texas Pacific (Mississippi Valley), from New Orleans to Memphis, 100 miles in State.

Taxation.—A new State constitution went into operation in 1880. The rate of State taxation is 6 mills ; the bonded State debt, $11,935,950. By a constitutional amendment, adopted in 1884, the interest on this debt was voluntarily raised from 3 to 4 per cent. The local taxes raised in the parishes vary from 6 to 10 mills. The country parishes (as the counties are called in this State) are not allowed to tax themselves beyond 1 per cent. without an election to order it. Special taxes are laid by several of them for school purposes, and all the riparian parishes on the Mississippi and Ouachita tax themselves for the building and repairing of levees. The rate of municipal taxation in New Orleans averages 2½ per cent.

Inhabitants.—The population of New Orleans is chiefly white, but in nearly all the country parishes the negroes are in excess, being more than ten to one in the upper river parishes of East Carroll, Tensas, and Concordia. The population of the State is the most mixed of any in the U. S. The population of New Orleans is divided as follows : of English and American descent, 18.3 per cent. ; of French descent, 17.3 ; German, 16.6 ; Irish, 15.8 ; Spanish, 2.6 ; Jewish, 1.9 ; Italian, 1.9 ; Negroes, 17.4 ; Mulattoes and other mixed breeds, 8.8 ; other whites, 1.0 ; Indians, Chinese, Malays, etc., .6. In the southern and south-western portions of the State a large proportion of the white population are descendants of the early French and Spanish settlers of Louisiana, preserving their original languages. In St. Bernard are the Islingues, descendants of a colony which came from the Canary Islands more than a century ago. The prairie region of St. Landry, Lafayette, St. Martin, and Iberia is occupied by the Acadians, the descendants of the French colonists expelled from Nova Scotia in 1755 by the British. In St. Charles, St. James, and St. John the Baptist are the remains of a colony of Germans from Alsace, who, however, have become completely gallicized. In nearly all the parishes of Southern Louisiana French is the predominant language, and in some of them, as St. Martin and Lafourche, nine-tenths of the population use that tongue. The descendants of the many early Spanish colonists have intermarried with the French creoles and adopted their habits and language. The whites of Northern and Eastern Louisiana are mainly the descendants of immigrants from Georgia, Alabama, the Carolinas, and Virginia. The population of foreign birth is confined almost entirely to the cities.

Recent History.—From 1866 to 1868 Louisiana was in a state of reconstruction under the military governorships of Generals Sheridan, Mower, Hancock, and Buchanan. A new constitution was formed in 1868, and Louisiana was fully restored to its privileges in the Union. From 1868 to 1877 it was in constant political excitement and ebullition, and disturbances were frequent. In the State election of 1872 two of the candidates for governor, Kellogg, Republican, and McEnery, Democrat, claimed to be elected. Two rival governments were established and continued in operation, side by side, for some time. A popular rising on Sept. 14, 1874, resulted in a battle on the levee in New Orleans, where 36 lives were lost and 180 persons wounded. The Kellogg, or Republican, government was overthrown, the State-house and other buildings occupied, and the McEnery, or Democratic, government installed, to be removed a few days afterward by the U. S. troops. In January, 1877, another difficulty occurred, and two State governments were inaugurated and continued in operation until March, when the Packard, or Republican, government was disbanded. Since then political peace has reigned in the State. Louisiana has suffered greatly by overflows of late years. Its levee system, constructed at an expense of over $24,000,000 before the civil war, fell into decay during that struggle, and Louisiana being unable to rebuild its levees much of its richest and most fertile land was overflowed and rendered impossible of cultivation. Magnificent plantations in the back portions of the upper river parishes, on the Atchafalaya and in Point Coupee, were given up to the flood. In 1874 occurred one of the most disastrous floods known, inundating one-sixth of the State and entailing great suffering, which was relieved by the assistance of the federal government and charitable contributions from all parts of the world. The flood of 1882, while not as extensive, caused great damage to the crops, the loss being estimated at $16,000,000 to $20,000,000. A small crevasse the next year struck one of the richest sections of the State and entailed a damage of $6,000,000 to $8,000,000. Since then the levee system of Louisiana has been restored and all injury from flood prevented. The State has enjoyed a great degree of prosperity between 1880 and 1886, as shown by the increase in assessed valuation of over $60,000,000, 820 miles of railroad built, and numerous other improvements. (N. W.)

LOUISVILLE, the largest city of Kentucky, county-seat of Jefferson county, stands in 38° 3′ N. lat., 85° 30′ W. long., and is finely situated on the S.

bank of the Ohio River 130 miles below Cincinnati. The river here descends 22 feet in 2 miles by a series of rapids called the Falls of the Ohio, and a canal has been constructed for the use of steamboats, which, except at high water, cannot pass over the rapids. This canal is 2½ miles long. The town stands on a high and level plateau, and has an area of about 18 square miles. Opposite the upper part of Louisville stands the city of Jeffersonville, Ind., to which extends a fine railroad bridge nearly a mile long. From the lower part of Louisville, called Portland, another railroad bridge extends to New Albany, Ind., and steam-ferry-boats ply to both these towns. Louisville is substantially built, and has wide and regular streets. In some of the best streets the houses have lawns or shrubbery in front. Lines of street railway connect the principal suburbs with the business quarters of the town. Among the principal buildings may be named the city-hall, the county buildings, the custom-house, the public library, the Roman Catholic cathedral, and the State institution for the blind. The churches are very numerous, and many of them are of high architectural excellence. Louisville is the see of a Roman Catholic bishop. The public school system is very complete and well sustained. Separate schools are established for colored children. There is a large number of private and parish schools of various grades. The four medical colleges are numerously attended and have a high reputation. The city has also a law-school, commodious theatres, several hospitals, orphanages and convents, an effective sewerage system, many large and well-managed hotels, gas and electric lights, and a good water-supply. A great a tesian well gives a copious flow, but its waters are somewhat saline, having a certain medicinal value, and are not adapted to household use. Louisville has a large number of banks and 6 daily and 20 weekly newspapers, some of them in the German language, and several monthly periodicals.

The city is the principal mart of trade for Kentucky and the lower part of the Ohio Valley, its active commerce giving it a high rank among the business centres of the country. It is a port of entry, and the objective point of numerous railway lines. The Louisville, Nashville, and Great Southern Railway system is one of the most extensive in the United States, and several other trunk lines, besides minor and local roads, contribute to the business of the city. Its tobacco trade is very large, the other great staples being pork, provisions, whiskey, grain, and flour. The city has large and increasing importance as a manufacturing centre. Pork-packing, the tanning of sole-leather, and distilling are among its leading industries. The manufacture of ploughs and other farm-implements, and of furniture, castings, machinery, gas- and water-pipes, cement, flour, and other goods are carried on very largely. Steam-power is mostly employed. Much of the coal-supply is from Pittsburg, Pa., but the city is favorably situated for drawing upon the immense and as yet almost entirely undeveloped coal-beds of Kentucky itself.

Louisville was founded in 1778 by George Roger Clarke, and was named in 1780 by the Virginia legislature in honor of Louis XVI. of France, who at that time was helping the United States in their war for independence. The introduction of steam-navigation in 1812 vastly stimulated its trade. A leading employment for many years was the transfer of goods from boats above to those below the falls. Louisville very early became a depot of supplies for the south-western cotton States, and had a good trade in mules, horses, ropes, bagging, and provisions for the lower Mississippi Valley. In 1828 it was chartered as a city. Since the war of 1861–65 Louisville has greatly increased its business, both as a manufacturing and as a trade centre. Its population in 1860 was 68,033; in 1870, 100,753; and in 1880, 123,758.

LOVEJOY, **Elijah Parish** (1802–1837), an American clergyman, was born at Albion, Me., Nov. 9, 1802. He graduated at Waterville College in 1826, and after spending a year in teaching became an editor at St. Louis. He studied theology at Princeton and in 1833 was ordained as a Presbyterian minister. In the St. Louis *Observer*, in 1836, he attacked slavery, but a mob compelled him to remove to Alton, Ill. Here further efforts were made to destroy his printing-press, and in a third attack, Nov. 7, 1837, he was killed. See *Alton Riots* (1838), by Edward Beecher, and *Life of Elijah P. Lovejoy*, by his brothers (1838).

His brother, **Owen Lovejoy** (1811–1864), was present when Elijah was killed, and thereafter became an anti-slavery lecturer. He was pastor of a Congregational church at Princeton, Ill., 1838–54, and a member of Congress, 1856–64.

LOVELL, **Mansfield**, an American general, was born at Washington, D. C., Oct. 20, 1822. He was the son of Dr. Joseph Lovell (1788–1836), surgeon-general of the U. S. army, and a direct descendant of John Lovell (1710–1788), the famous "Master Lovell" of the Boston Latin School just before the Revolution. Mansfield graduated at West Point in 1842, and entered the artillery. He served in the Mexican war, at first under Gen. Taylor and afterwards under Gen. Scott, being chief of staff to Gen. Quitman. He resigned from the army in 1854 to engage in Gen. Quitman's projected Cuban expedition, but when that failed he obtained employment in iron-works at Trenton, N. J. He was deputy commissioner of the public works of New York from 1858 to 1861. On the outbreak of the civil war he entered the Confederate service as a brigadier-general, and in October, 1861, was placed in command of New Orleans. After the capture of this city by the Union forces under Admiral Farragut and Gen. Butler, Lovell joined Beauregard at Corinth. On the death of Gen. Polk, June 14, 1864, Lovell succeeded to his command, and he repulsed Sherman at Kenesaw, June 27, 1864. After the war he was an engineer in New York, where he died June 1, 1884.

LOWELL, a city of Massachusetts, seat of justice in Middlesex county, stands chiefly on the S. bank of the Merrimac River, 25 miles N. by W. of Boston. It is on the Boston, Lowell, and Concord Railroad, at the junction of branches to Salem, Lawrence, and Ayer. It is also on a branch of the Boston and Maine Railroad, and is the terminus of the Framingham and Lowell Railroad, leased to the Old Colony Road. The city is well laid out, largely on uneven and hilly ground. The streets are well paved and sewered, are lighted with gas and electricity. The Merrimac here falls 33 feet, affording great hydraulic power, but steam-power is extensively used in the great factories which are the distinctive feature of the place. Among the public buildings are the court-house, jail, city-hall, a large hospital, and some fine school-houses. Lowell has a large free library, 7 national banks, 6 savings banks, and an effective water-supply. The churches are about 40 in number, and several of them are of excellent architecture. The principal mills and shops are owned by incorporated companies. Cotton, woollen, and mixed goods of all descriptions, machinery, metallic wares, leather and leather goods, paper, chemicals, carriages, files, hardware, and a great variety of other goods are here produced. Lowell has several hospitals, orphanages, homes for the aged and disabled, and other charitable institutions. From its earliest start great attention has been paid to the homes and boarding places of the operatives, and in general the well-being of the laboring classes has been attended to, so that strikes and other labor troubles have been rare. Evening and technical schools are maintained, and several reading-rooms and lectureships, nearly free of expense to working people, yet of high excellence, are kept up. There are 5 daily and 6 weekly newspapers, some of them in the French language, a large number of the operatives being of French-Canadian birth. In the early days of Lowell many of the factory people were the sons and daughters of respectable farmers and villagers; and although the native New England element among the factory people is not now conspicuous, the character and intelligence of the operatives are still relatively high. Lowell was founded in 1823, was named and incorporated in 1826, and was chartered as a city in 1836. Population in 1870, 40,928; in 1880, 59,475. In respect of population it is the second city in the State.

LOWELL, Francis Cabot (1775–1817), an American merchant, founder of the city of Lowell, was born at Newburyport, April 7, 1775, being a son of John Lowell (1743–1802). He graduated at Harvard College in 1793, and entered into mercantile life. In 1810 he went abroad for the sake of his health, and his observations in England convinced him of the practicability of establishing cotton manufacture in Massachusetts. He therefore induced P. T. Jackson to join him in the experiment at Waltham and afterwards at Lowell, which was named for him. By personal influence with the members of Congress he obtained the enactment of such a protective tariff in 1816 as greatly to stimulate cotton manufacture. He died at Boston, Sept. 2, 1817.

LOWELL, James Russell, an American poet, was born at Cambridge, Mass., Feb. 22, 1819. He was the son of Rev. Charles Lowell (1782–1861), who was for 55 years pastor of the West Congregational Church, Boston, and is directly descended from Percival Lowell, who, having been a merchant at Bristol, England, settled at Newbury, Mass., in 1639. He bears the name of his father's maternal grandfather, Judge James Russell. His education was obtained in Cambridge, and he graduated at Harvard College in 1838, when his "class poem," his first production in print, attracted some attention. He studied law at Harvard, and was admitted to the bar in 1841. But his inclination was steadily toward literature, and after a few years he abandoned the profession. His first book of poems appeared in 1841 under the title *A Year's Life.* Some of these early poems may be found in later collections, revised by his mature judgment, others have been quietly abandoned. In 1843, for a few months, Lowell and his friend, Robert Carter, published an illustrated magazine called *The Pioneer*, but though Edgar A. Poe and Nathaniel Hawthorne were among the contributors it did not obtain financial success. In 1844 came his second volume, containing the "Legend of Brittany" and some other poems, showing real mastery of the poet's art, as well as deeper study of the human heart. It contained too the first expression of that hostility to American slavery which stimulated many of later efforts. For the present they were only sonnets to Wendell Phillips and J. R. Giddings, the abolition heroes of the time, but ere long Lowell was to be himself a trumpeter if not a combatant in the strife.

His second series of *Poems* (1848) contained several pieces which gave expression to the genuine feeling of New England at the aggressions of the Southern slaveholders. Meantime Lowell had been carefully studying the early English poets, and he gave some of the results in *Conversations on Some of the Old Poets* (1845). Since that time these poets have been more carefully studied by all lovers of English undefiled, and these criticisms appear tame and apologetic. But Lowell's next poem, *The Vision of Sir Launfal* (1848), founded on the legend of the San Greal, is a surer evidence that he had been taken into the fellowship of the masters of English verse. Widely different and thoroughly Yankee was the keen satire which appeared under the name of *The Biglow Papers.* Mr. Hosea Biglow is a grim, matter-of-fact, irrepressible Yankee, who cannot be fooled with the ingenious pleas put forth by politicians in behalf of the extension of slavery. "Homer Wilbur, A. M., pastor of the First Church in Jaalam," edits the homely verse of the farmer, and gives it all the surroundings of introduction, notes, glossary, and index, which accompany the modern editions of classic satirists. He is a genuine descendant of the New England divine of the seventeenth century, speaking with authority words of wisdom, but shorn of much of the pristine grandeur of his office. But from title-page to finis the book bristled with sharp stings for the apologists for men-stealers and slave-breeders. The second series of *The Biglow Papers* appeared in the *Atlantic Monthly* during the civil war, and though characterized by much of the sprightliness, wit, and humor which belonged to the former series, were not equal in force and solid argument. Unreasonable as was the action of the government of Great Britain in regard to the American war, it was not so immoral, and therefore did not demand so powerful satire as did the lives, speeches, and works of the American worshippers of slavery. To return to the year 1848, the culminating point of Mr. Lowell's career before the war: in it appeared anonymously *A Fable for Critics*, which discussed in a playful way the leading writers of the time. Mr. Lowell made his first visit to Europe in 1851, and for some years his only contributions to literature were articles in the *North American Review* and other periodicals. In 1854 he lectured before the Lowell Institute on "English Poetry," and in 1855 he was appointed successor to Mr. Longfellow as professor of modern languages and belles lettres in Harvard, with the customary privilege of spending a preliminary year in Europe. Returning in 1856 he entered with zeal upon the discharge of his duties. He also became editor of the *Atlantic Monthly*, the first number of which was issued in November, 1857. Gathering around him a choice company of contributors, and ably seconded by liberal publishers, he gave to the new periodical a higher and more distinctively literary tone than had belonged to any American magazine of earlier date. After five years of conscientious labor in this field he resigned his editorial connection with the *Atlantic*, but soon after joined his friend, Charles E. Norton, in the conduct of the *North American Review*, to which he had already been a contributor. He began again to issue books, his editorial duties having interrupted his production for some years. In 1864 appeared *Fireside Travels;* in 1867 a new series of *Biglow Papers*, directed against Pres. Johnson's policy of restoring the Southern States at once to their former status in the Union. Then came two volumes of poems, *Under the Willows* (1868), and *The Cathedral* (1869); and two volumes of literary essays, *Among My Books* (1870), and *My Study Windows* (1871). These still remain among his most pleasant and charming essays and poems; they reveal the heart of the writer in its friendships and its sympathy with all that is true and noble in the world's history. The "Commemoration Ode," delivered at Harvard College, when memorial services were held, July 21, 1865, for the alumni who had fallen in the war for the Union, is the loftiest expression of his genius. To do justice to those of his foster-brethren who had sealed their faith in the cause of freedom with their life's blood his genius was roused to put forth its utmost power, to attain its highest flight.

Lowell's greatness as a poet had long been felt and acknowledged by the intellectual classes, but his books were not sought for by the multitude. Only when his fame was well established, when he had on fitting occasion given voice to the deepest feeling of the nation's heart, did there begin to be a demand for collected editions of his works. Four editions were issued in 1870, and others since that date. At the same time his merits became recognized in England, and when he went to Europe in 1872 he was honored with the degree of D. C. L. by the University of Oxford in 1873, and with that of LL. D. by the University of Cambridge in 1874. It still remained for his own government, which in former times had acknowledged the worth of literary and historical merit by giving important diplomatic positions to its eminent writers, to pay the same tribute to Lowell. In June, 1877, Pres. Hayes appointed him minister-plenipotentiary to Spain, and in 1881 he was transferred to Great Britain, where he remained until he was recalled in May, 1885, on the accession of a Democratic administration to power. Mr. Lowell, in these positions, had not only maintained the rights and dignity of the nation which he represented, but by his scholarly ability and graceful manners had won the hearts of the people to himself. When his recall became known there were some indications of a movement to invite him to the professorship of poetry at Oxford, but he insisted on returning to his native land. (J. P. L.)

LOWELL, John (1743–1802), an American jurist, was born at Newburyport, Mass., June 17, 1743. His father, Rev. John Lowell, was the first minister of that place. The son graduated at Harvard College in 1760, and was admitted to the bar in 1762. He was elected to the legislature in 1776, and removed to Boston in 1777. In 1780 he took an active part in framing the constitution of Massachusetts, and in order to abolish slavery in the State had inserted in the bill of rights the clause declaring that "all men are born free and equal." His view of the effect of this clause was sustained by the Supreme Court of the State in 1783. He was a member of Congress, 1782–83, and was by it appointed a judge of appeals of admiralty. In 1789 he was made U. S. judge for the district of Massachusetts, and in 1801 was made chief-justice of the first circuit. He died at Roxbury, Mass., May 6, 1802.

LOWELL, John (1769–1840), an American lawyer, son of the preceding, was born at Newburyport, Mass., Oct. 6, 1769. He graduated at Harvard College in 1786, and was admitted to the bar in 1789. He soon became eminent in his profession, and in 1803 went to Europe where he spent three years. By his writings in pamphlets and newspapers he had great influence on public opinion, but he uniformly declined public office. He was one of the founders of the Massachusetts General Hospital and of other public institutions. He died at Boston, March 12, 1840.

LOWELL, John (1799–1836), the founder of the Lowell Institute, was born at Boston, May 11, 1799, being the son of Francis C. Lowell. He was educated at the Edinburgh high-school and at Harvard College. On account of ill health he left college and made two voyages to India, and afterwards engaged in commerce. In 1831, having lost his wife and children within the previous year, he gave up business and travelled through the United States. He then set out on a tour over Europe to Asia-Minor and Egypt, and died at Bombay, March 4, 1836. By his will he left $250,000 to maintain in Boston annual courses of free public lectures on religion, science, literature, and the arts.

LOWELL, Robert Traill Spence, an American clergyman and author, was born at Boston, Oct. 8, 1816. He is an elder brother of the poet James Russell Lowell. He was educated at Round Hill School and Harvard College, graduating in 1833. He studied medicine but afterwards turned to theology, and was ordained a priest of the Church of England in 1842. He was bishop's chaplain in the Bermuda Islands, and afterwards rector at Bay Roberts, Newfoundland. Here he remained until during a season of famine he was compelled in consequence of overwork as a commissioner of food-distribution to seek a more genial climate. He afterwards had charge of churches at Newark, N. J., and Duanesburg, N. Y., and a school at Southborough, Mass. In 1873 he became professor in Union College, Schenectady, N. Y. His chief work is *The New Priest in Conception Bay* (1858), a powerful novel, in which the struggle between the Roman Catholic Church and the Church of England is picturesquely set forth against a background of the desolate and dreary life of Newfoundland. Mr. Lowell has also published a volume of *Poems* (1864) and *Antony Brade* (1871), a book for boys.

LOWRY, Robert, an American clergyman, was born in Philadelphia, March 12, 1826. He graduated at the University of Lewisburg, Pa., 1854, and has been pastor of Baptist churches in West Chester, Pa., New York, Brooklyn, and Plainfield, N. J. He was professor of belles lettres in his alma mater, 1869–75. He is conspicuous as a writer of Sunday-school and devotional hymns and music, in which line his compositions considerably antedated the music books for these special departments. In addition to composing hymns and tunes he has been sole or joint editor of *Chapel Melodies* (1868); *Bright Jewels* (1869); *Pure Gold* (1871); *Royal Diadem* (1873); *Temple Anthems* (1873); *Brightest and Best* (1875); *Welcome Tidings* (1877); *Fountain of Song* (1877); *Chautauqua Carols* (1878); *Gospel Hymn and Tune Book* (1879); *Good as Gold* (1880); *Our Glad Hosanna* (1882); *Joyful Lays* (1884). About 4,000,000 copies of these books have been issued.

LOYSON, Charles, a French preacher, known as Père Hyacinthe, was born at Orleans, March 10, 1827. He was educated at Pau, where his father was rector of the academy. He studied theology at St. Sulpice and was ordained priest in 1849. He was called to teach philosophy at Avignon and theology at Nantes, and afterwards had charge of the parish of St. Sulpice. Thus passed ten years, and then Father Loyson retired to the convent of the Barefooted Carmelites at Lyons, and after two years' novitiate entered that order, taking the name Hyacinthe. On coming forth as a preacher he at once attracted attention by his vehement oratory. After some courses at Bordeaux and Périgueux in 1864 he went to Paris, where his Advent sermons at the Madeleine and at Notre Dame drew large crowds. His eloquent harangues were not always acceptable to the orthodox Romanists, and in 1869 Veuillot, the editor of *L'Univers*, denounced him to the pope, but Père Hyacinthe succeeded in justifying himself. Only a few weeks later he delivered an address before the International League of Peace, in which he spoke of the Catholic, Protestant, and Jewish religions as "the three great religions of civilized peoples." When ordered to withdraw the expression, which had given great offence, he wrote Sept. 20, 1869, to the head of his order a letter denouncing the manner in which Catholicism had long been understood and practised as the cause of the social, moral, and religious anarchy of France and the Latin races in general. This manifesto produced a profound sensation. The major excommunication was pronounced against the recreant monk, but he declared his intention to remain in the Catholic faith. After a brief visit to the United States, where he was received with much favor, he returned to France; but during the Franco-German war he withdrew to London. In September, 1871, he attended the Congress of Old Catholics at Munich. But his brother, Abbé Theodose Loyson, professor of theology at the Sorbonne, now openly renounced him, and the rupture with the Catholic Church was complete when, on Sept. 2, 1872, the quondam Carmelite was married in London to an American lady, widow of E. R. Merriman, *née* Emily Jane Butterfield. His order then, according to its rule, formally interred the one who had broken his vows. In February, 1873, Loyson was elected curate at Geneva, but in the next year he was compelled to dissolve all connection with the Liberal Catholics, whom he pronounced neither Catholic nor Liberal. In London he found much sympathy, but when he returned to Paris the authorities refused the necessary permission to his conferences until 1877, when he was allowed to hold "private reunions." These were attended by thousands of hearers, and were regularly reported in several journals. When the novelty wore off they had not the same success. In June, 1878, M. Loyson was installed as rector of a Gallican church, opened in a former concert-room. The municipal council steadily refused to grant him the use of a public building, and he in turn attacked the French Republic as not granting true religious freedom.

Loyson's publications have been chiefly sermons or addresses. Among those issued, while he still remained a Carmelite, were *Société civile dans ses rapports avec le Christianisme* (1867); *Matérialisme et spiritualisme* (1867); *La Famille* (1867). Since he left the Roman Catholic Church he has published a series on subjects as *Le Dimanche et les classes laborieuses*, *La Réforme catholique*, *L'Ultramontanisme et la Révolution*.

LUBBOCK, SIR JOHN, BARONET, an English statesman and naturalist, was born at London, April 30, 1834. His father, Sir John William Lubbock (1803–1865), was a banker, and also of some note as an astronomer. Sir John was educated at Eton, but at the age of fourteen entered his father's banking-house, and in 1856 became a partner. He gave due attention to the business and introduced improvements into banking affairs, among which were the publication of the Clearing House returns. In 1865 he succeeded to his father's title and business. His name first became widely known by his investigations of the ancient vestiges of the human race. His first work was *Prehistoric Times, as illustrated by Ancient Remains and the Manners and Customs of Modern Savages* (1865), and was followed by *The Origin of Civilization and the Primitive Condition of Man* (1870). Both these works, which link together the primitive condition of man and the rude life of the lowest existing races, have been enlarged in successive editions and translated into several languages. But Sir John Lubbock did not confine his investigations to the human race. Flowers and insects claimed his attention also, and he has published many memoirs on zoölogical, physiological, and archæological subjects. Among his works are *Origin and Metamorphoses of Insects* (1874); *On British Wild Flowers* (1875); *Ants, Bees, and Wasps* (1884). In 1870 Sir John Lubbock entered Parliament as the representative of Maidstone. He is a Liberal, and as a legislator has devoted his attention chiefly to financial educational matters. He has procured the passage of important public measures, and was a member of the Public School Commission and of the Advancement of Science Commission.

LÜBKE, WILHELM, a German art historian, was born at Dortmund, Jan. 17, 1826. He studied at Bonn and Berlin, and attracted attention by his articles in the *Deutsche Kunstblatt* on the history of art. In 1855 he was made professor of the history of architecture in the Berlin school of architecture. From 1858 to 1860 he made several journeys in Italy, France, and Belgium. In 1861 he became professor of archæology and the history of art in the Polytechnic School at Zurich, and in 1866 he was called to a similar position at Stuttgart. His principal works are *Vorschule zur Geschichte der Kirchenbaukunst des Mittelalters* (1852; 6th ed., 1877); *Geschichte der Architektur* (1855; 5th ed., 1875); *Grundriss der Kunstgeschichte* (1861; 7th ed., 1875); *Geschichte der Plastik* (1863; 3d ed., 1878). He has also prepared new editions of the works of Kugler.

LUDEWIG, HERMANN ERNST (1809–1855), an American bibliographer, was born at Dresden, Saxony, Oct. 14, 1809. He was carefully educated and early devoted himself to bibliography. He published at his own expense *Livre des Ana, Essai de Catalogue Manuel*. He removed to the United States in 1842, and practised law in New York. He continued his literary work and published *The Literature of American Local History* (1846), with a *Supplement* (1848). He died suddenly at Brooklyn, Dec. 12, 1856. A valuable work left unfinished in the printer's hands was afterwards published in London under the title *Literature of American Aboriginal Languages* (1858). Ludewig had contributed to the *Serapeum* valuable articles on American libraries and kindred topics.

LUDWIG, KARL FRIEDRICH WILHELM, a German physiologist, was born at Witzenhausen, Hesse, Dec. 23, 1816. He studied medicine at Marburg and Erlangen, and was appointed professor of comparative anatomy at Marburg in 1846. He held the chair of physiology at Zurich from 1849 to 1855, when he was called to Vienna, and in 1865 he became professor at Leipsic. His investigations in anatomical physiology have given him rank as a master in that department. His chief work is *Lehrbuch der Physiologie des Menschen* (2 vols., 1852–55), but his *Arbeiten aus der Physiologischen Anstalt zu Leipzig* (1866, *et seqq.*) and his essays in scientific journals contain valuable contributions to science.

LUMBER. At the era of the discovery of America nearly the whole vast region east of the Mississippi was covered with an almost continuous forest, embracing numerous species of trees of the highest economical value. From the Mississippi westward to the Pacific the forest region was more limited in extent, though several immense districts of primeval woodland existed. These forests furnished a source of wealth to the colonists whose value has never been properly appreciated, and which has been dealt with in a spirit of blind wastefulness almost without parallel in the history of mankind. This destructiveness still continues, almost without a check, and the American forests are disappearing at a rate which, if continued, will ere many years produce a genuine scarcity of the most indispensable material of civilization. (See FORESTRY.)

Very shortly after the settlement of America, probably shortly before 1633, the saw-mill made its appearance in the colonies, many years before its introduction into England, and replaced the crude hand-hewing and sawing of the primitive colonists. Water-power was from the first made use of to run these mills, and they rapidly multiplied, following the navigable streams, and cutting deep swathes into the primeval forests, with a lack of economy then warranted by the seemingly inexhaustible supply, and the need of clearings for agricultural purposes. In the haste to clear the surface many of the colonists did not wait for the slow labor of the axe and the saw, but set fire to the woodland, and many millions of acres of splendid forest were thus burned over, with no economical result other than that of obtaining a little potash from the ashes.

Of the methods adopted to "waste our inheritance" fire is still one of the most destructive. Millions of acres are annually swept by this agent of ruin, the area burned over in the year 1880 alone being no less than 10,274,089 acres. Yet these fires were very largely the result of sheer carelessness and indifference, and the most of them might have been avoided. The principal sources of forest fires are the carelessness of farmers in brush-burning and of hunters with camp-fires. The sparks from railroad engines are another destructive agency, while the heaps of dried refuse left by the lumbermen are like so many powder magazines, and aid essentially in the spread of the flames. The immediate money-loss is but a portion of the injury from fire. Its action is to destroy the fertility of the soil, so that years of useless undergrowth must elapse ere the surface is in condition to bear another forest. And it is very common for trees of great economic value to be succeeded by other species of minor importance.

Browsing animals are another source of great damage. It is common in the southern Atlantic region and in California to turn animals into the woods, and immense numbers of seedlings are annually destroyed by the browsing of sheep, cattle, and horses, while large trees are often ruined by the loss of their bark through this means. Hogs add to the ruin by rooting up the young pines and feeding on their succulent roots. If we add to these sources of injury the reckless wastefulness of the lumbermen, the selection of vigorous young trees for railroad ties, the almost utter neglect to replant denuded soils or to protect the young forest growth, it cannot be wondered at that our forests are rapidly disappearing, and that, at the present rate of destruction, the close of the nineteenth century will leave us with an actual scarcity of the most valuable lumber trees.

That this destruction is unnecessary and could be readily avoided we have satisfactory proof from the recent action of the people of Maine. In that State the reckless waste which formerly prevailed has been replaced by a careful preservation, and forest-fires have almost ceased, chiefly through the force of a healthy public opinion. The cutting of young trees is in a great measure prohibited, while large areas are being replanted. This action has arisen from the discovery by the people that one of their chief sources of wealth was rapidly vanishing. As a consequence the forests of Maine now yield a fixed annual supply, and the results of common sense in forestry in that State present an example of the utmost value to the lumbering population of every State of the Union. Despite all the waste that has taken place the forest wealth of the United States is still enormous. It will last for many years even with the present rapid depletion. With proper care in its management a permanent supply, for centuries to come, might be assured.

Of the original forests of the United States, the immense extent of white pine timber, the most valuable source of the lumber supply, has suffered fatal inroads, and is nearly exhausted in New England, New York, and Pennsylvania, once abundantly supplied. The pine forests of the West are being rapidly destroyed. In the South Atlantic and Gulf States there exists a vast belt of timber highly valuable for constructive purposes, though unsuited, from its hardness, to take the place of the easily worked white pine of the North. In the Gulf States, for instance, the vast primeval forests of the long-leaved and short-leaved pine (*Pinus palustris* and *mitis*) are almost intact and must yet prove of high value. At the present day Michigan is the greatest lumber-producing State in the Union. Its production, with that of Wisconsin and Minnesota, exceeds one-third the total value of the lumber produced in the United States. This enormous development is due to the excellence and abundance of its forests, the natural advantages of the country for lumber manufacture, and the easy communication between these forests and the treeless agricultural region west of the Mississippi. As the lumber of this region, which is now being rapidly depleted, gives out, it must be replaced by the pine forests of the Gulf, or by those of the Pacific coast. In the Pacific region immense forests of coniferous trees yet exist, the most valuable species in the northern region being the great red fir, which spreads from the summit of the Cascade range westward to the Pacific in a very dense forest belt. In California this species is associated with the great redwood forests of the coast range, comprising a most valuable store of lumber, which is unsurpassed within the United States for productive value and accessibility. The redwood is the only real substitute for white pine within our country, and at the present rate of consumption this forest promises to soon lose its commercial value. The mountain ranges of this region, from California to New Mexico, possess great forests of pine, yet almost intact.

As to the supply of hard-wood lumber the forests of the Mississippi basin are yet important, though their best walnut, ash, cherry, and yellow poplar have largely decreased. Two great bodies of hard-wood timber remain, little affected. The most valuable of these is the forest range of the Southern Appalachian system, in its extension through Virginia and West Virginia, North and South Carolina, Kentucky, and Tennessee. Here there yet exists an abundant store of oak timber of unequalled quality, a good supply of walnut, and an abundance of cherry, yellow poplar, and other valuable woods. The second great body, largely composed of oak, lies west of the Mississippi, extending from Central Missouri to Western Louisiana. The forests of Michigan have still a large supply of hard-wood timber, principally maple. But elsewhere throughout the Atlantic region the hard-wood forests have lost their best timber, and cannot be depended on for important additions to the annual supply. The lumbering industry has steadily moved from the east westward. Half a century ago Maine was the great lumbering region. The main competition came from New York and Pennsylvania, which at times equalled, and, in 1860, much exceeded her. By this date Wisconsin and Michigan had become prominent, and eclipsed Maine in the next decade. At present Chicago is the great lumber market of the country, Albany ranking second, from its nearness to the Adirondack forest region. But at the present rate of depletion of these western woods their available timber of commercial value will ere long disappear, and Chicago will lose its importance as a centre of the lumber industry. The army of the axe and the saw will again have to take up its line of march, westward to the forests of the Pacific slope and southward to those of the Gulf region, and the white pine, the most valuable of our lumber trees, will lose the prominence it has heretofore maintained. This species, once spread over the whole northern region from the Atlantic to the Mississippi in extraordinary abundance, is now so depleted that, according to the estimate of Prof. Sargent, the total supply of white pine in 1882, ready for the axe, little if at all exceeded 80,000,000,000 feet, while it was being consumed at an annual rate of 10,000,000,000 feet, with a rapidly increasing demand. At this rate it will be exhausted in less than 10 years. The yellow pine of the South is a hard, resinous wood, not suited to replace the white pine. Its most valuable substitute is the redwood of the California coast range. This has also come recently into special favor as an ornamental wood, and the demand for it is increasing both in this country and in Europe. If the destruction goes on at the present rate it will not long serve as a source of supply.

As to the uses of lumber in this country great and important changes have taken place within the century. Other changes of importance are probable in the near future. These changes are in the direction of the replacement of lumber in construction by other and less perishable materials. Every movement of this kind is a positive advantage, yet despite all that has been done the rapidly growing population prevents any diminution of the demand and keeps it at a steady rate of increase. It must be far in the future ere this condition can be reversed and the drain on our forests diminish.

The large ship-building industry of 40 or 50 years ago has greatly declined, but probably only temporarily. The wooden bridges of the past are being replaced by bridges of iron. In the building arts brick, stone, and iron have become important substitutes for wood, but only externally, and the use of wood in construction is still on the increase. In the item of fencing, once a heavy drain on the lumber supply, the wire fence is coming into use as a valuable substitute. Another highly important change is in the wide-spread use of coal, gas, petroleum, etc., for fuel, both for domestic and for mechanical purposes. Yet in despite of all these substitutes the use of wood for the purposes named is on the increase. During the census year the consumption of wood as fuel was estimated at 145,000,000 cords, valued at $322,000,000. In like manner, despite the increased employment of metal and gravel roofs, the shingles manufactured in 1880 numbered 5,555,046,000. As for furniture, agricultural implements, and an immense variety of other objects of common use, wood still serves as the basis of the manufacture, and great stores of the more valuable hard woods are annually consumed for these purposes. Wood paper is becoming an important item of commerce, and an abundant supply of poplar, spruce, and some other woods is needed for this purpose. At present telegraph poles and railroad ties, particularly the latter, consume great stores of wood and form a vital drain upon our forest supplies. It is possible that the replacement of wood by slag and other indestructible materials, now proposed for railroad ties, may yet check this drain. If so, it will prove a valuable aid in the conservation of our forests.

The rapid consumption of wood in the arts here indicated could not have taken place under old conditions of manufacture. The replacement of manual labor by machine labor, and the invention of a great variety of wood-working machines, have been among the most important features of American progress in the last half century. The circular saw, the turning lathe, the ribbon saw, the planing and shaping machines, the sash, door, and blind machines, and numerous other implements, have revolutionized the industry, and enabled the mechanic to fairly keep up with the woodsman in the utilization of our lumber product. The saw-mills have also greatly increased their capacity, so that the average output of each has largely augmented.

In	1850	the product	of	17,895	mills was	$58,520,966
"	1860	"	"	20,165	"	104,928,342
"	1870	"	"	26,930	"	252,032,229
"	1880	"	"	25,708	"	233,268,729

Of the woods manufactured into lumber in America, and employed in the arts, the most important of the conifers is the white pine (*Pinus strobus*), which is wrought more largely into lumber, shingles, lathes, etc., than any other North American tree. It constitutes the common building material of the Northern States, and is used largely in cabinet-making, in the manufacture of woodenware, matches, and a host of other articles. Of the other pines of value as lumber may be named *P. palustris* and *P. mitis* of the South, *P. Lambertiana*, the sugar pine of the Pacific, and *P. resinosa*, the red or Norway pine of the East. The pines generally are employed as fuel.

Other valuable conifers are the hemlock (*Tsuga Canadensis*), which yields a coarse lumber much used for outside finish; the black spruce (*Picea nigra*), used in construction, ship-building, etc.; the red fir of the Pacific (*Pseudotsuga Douglasii*), a valuable source of lumber for general purposes; the redwood (*Sequoia sempervirens*), the most valuable building material of the Pacific coast; the red cedar (*Juniperus Virginiana*), of great value for posts, sills, etc., and used almost exclusively for lead-pencils; and the white cedar (*Chamæcyparis thyoides*) of the Atlantic coast, one of the most valuable timber trees of the country. The white and red cedars of the Pacific coast are also largely employed. *Larix Americana*, the larch or tamarack, is preferred for the upper knees of vessels, for ship-timbers, etc. Other valuable conifers might be named, of which we will only mention the yellow or Sitka cypress of Alaska, which, though not much used as yet, is said to be unsurpassed in beauty in North America as a cabinet wood.

Of deciduous, hard-wood trees the forests of America possess an abundant variety, of which we can name here only the more important species, with their principal uses. Of the maples the sugar and the red maple are the chief species used. They are employed in turnery, interior finish, cabinet-making, ship-building, etc. The sugar maple yields the "curled" or "birds-eye" maple, with its beautifully contorted grain, so highly prized in cabinet-making. Many species of oak furnish valuable lumber, of which the white oak (*Quercus alba*) is the most important. It is used largely for ship-building, for construction of all sorts, for carriages, agricultural implements, baskets, interior finish, cabinet-making, etc. *Quercus Garryana*, the western white oak, is the best western substitute for the species above named. All the oaks are valuable as sources of fuel. Nearly every species of hickory is of high value as fuel, while they are largely employed for agricultural implements, carriages, axe-handles, baskets, etc.

The most highly valued at present of our hard-wood trees is the black walnut, which is more generally used in cabinet work and interior finish than any other North American tree. Other woods valued for similar purposes are the wild black cherry, now growing scarce; the butternut; the mountain hazel and the broad-leaved maple of the Pacific region; the white and the black ash; the American holly; and the chestnut. Among trees largely used for less important purposes may be named the American linden, tulip-tree or yellow poplar, the white, red, and rock elms, and the Ohio buckeye, which is particularly used in making artificial limbs. Of lumber trees valuable in special directions may be named the beech, used largely for chairs, shoe-lasts, plane-stocks, etc.; the canoe birch, for spools, shoe-lasts and pegs, turnery, and wood pulp; the yellow birch, for button- and tassel-moulds, pill- and match-boxes, and wheel-hubs; the various poplars, for wood pulp; the flowering dogwood, for turnery, wood-engraving, wheel-hubs, bearings of machinery, etc.; the sour gum or tupelo, for wheel-hubs, rollers in glass-factories, ox-yokes, etc.; the sycamore, mainly used for tobacco-boxes, though also for ox-yokes, butchers' blocks, etc.; and the locust, which is preferred to all other trees for tree-nails, and in this form largely exported. Many other trees might be named, but the above include the most important varieties used in constructive purposes. For railroad ties, fuel, etc., very many species are employed.

Of the returns of the lumber product of the country, as given in the 1880 census report, many of the items are confessedly incomplete and unsatisfactory through the difficulty of obtaining full statements. The return for railroad ties, for instance, is much below the actual value, and the total return is estimated to be more than $200,000,000 below the value of the complete product. We give a brief synopsis of these returns:

Saw-logs, valued at	$139,836,869
Domestic fuel, estimated at	306,950,040
Railroad fuel	5,126,714
Steamboat fuel	1,812,083
Manufacturing fuel	8,073,536
Charcoal as manufacturing fuel	5,276,736
Naval stores	5,000,000
Railroad ties	9,806,247
Hoop poles	1,947,316
Used in manufacture of handles, wheel stock, wood pulp, baskets, and other small uses	4,898,013
Total	$490,073,094

Among the items omitted in this report is that of fencing, which alone probably exceeded $100,000,000. There are no returns of bark used in tanning, of unsawed timber, of ties for 10,000 miles of new railroad, and of several other items, so that the estimated deficiency above given is probably not over the mark. The statistics of the lumber-manufacture industry for 1880 are given in the census report as follows:

Number of establishments	25,708
Capital	$181,186,122
Number of hands employed	147,956
Wages paid	$31,845,974
Value of logs	$139,836,869
Value of mill supplies	$6,318,516
Lumber, board measure, feet	18,091,356,000
Laths, " " "	1,761,788,000
Shingles, number	5,555,046,000
Staves, "	1,248,226,000
Sets of headings, number	146,523,000
Spool and bobbin stock, board measure, feet.	34,076,000
Value of all other products	$2,682,688
Total value of all products	$233,268,729

In the production of this material the comparative rank of the principal States was Michigan, Pennsylvania, Wisconsin, New York, Indiana, Ohio, and Maine, the value of the product ranging from over $50,000,000 for Michigan, and $22,000,000 for Pennsylvania, to nearly $8,000,000 for Maine. The position of Pennsylvania in this category, however, has since been rapidly declining.

The exportation of forest products, consisting of sawn and hewn timber, boards, deals and shingles, cabinetware, furniture, etc., from the United States, during the year ending Sept. 30, 1885, amounted to a value of $21,423,175. The importations during the same period aggregated in value $8,312,576. These included woods used for the finest cabinet finish, of species not grown in the United States, such as rose- and satinwood, mahogany, ebony, etc. The use of some of these has considerably decreased of late years, particularly mahogany, through the practical exhaustion of the finest grades of this wood. It has been replaced in public favor by black walnut, while others of our finer-grained woods have come into extensive use for cabinet work and interior house finish. The facility of imitating the best grades of foreign woods by staining and varnishing has also acted to decrease the use of foreign woods in favor of the product of our home forests. (C. M.)

LUNDY, Benjamin (1789–1839), an American abolitionist, was born in Sussex co., N. J., Jan. 4, 1789, of Quaker parentage. When 19 years old he went to Wheeling, Va., where he worked as a saddler. Having established himself in business at St. Clairsville, Ohio, he founded there in 1815 the "Union Humane Society," and soon took a decided stand as a friend of emancipation. In 1821 he established at Mt. Pleasant, Ohio, a monthly periodical called *The Genesis of Universal Emancipation*, which he soon removed to Jonesborough, Tenn. In 1824 he began to issue his paper at Baltimore, where a year later it became a weekly. Lundy travelled extensively in the Southern States, organizing abolition societies and often holding public anti-slavery meetings. In 1825 and later he visited Hayti, Mexico, and Canada in order to make some provision for colored emigrants from the United States. He also made extensive journeys, mostly on foot, throughout a great part of the country, often speaking in public. Among the converts to his views was William Lloyd Garrison (for whom see ENCYCLOPÆDIA BRITANNICA). Lundy's paper was in 1829 removed to Washington, and in 1836 to Philadelphia, where in 1838 the burning of Pennsylvania Hall by a mob left Lundy penniless, his effects having been destroyed in the fire. In that year he removed to Lowell, Ill., and there died of a fever, Aug. 22, 1839. He was a man of slight and feeble frame, without wealth or great abilities, was partially deaf, and as a speaker had no remarkable gifts. Yet his entire and perfectly honest and unselfish devotion to the single dominant object of his life made him influential and useful beyond the common lot of men. His gentle manners and his principle of non-resistance protected him from personal violence, except on one occasion, when he was badly beaten by a slave-trader. Besides this, there was in his earlier years a considerable anti-slavery element in the South, especially in Virginia, North Carolina, and Tennessee. This element was looked upon as *doctrinaire*, and considered unimportant; but it gave him some countenance and help. Lundy was the first man, at least in America, who gave up his time and property to devote himself to the cause of human liberty. His successors, led by Mr. Garrison, were stronger and abler men, but none were more devoted or more disinterested. See Thomas Earle's *Life of Benjamin Lundy* (1847).

LUNT, George (1803–1885), an American author, born at Newburyport, Mass., Dec. 31, 1803. He graduated at Harvard College in 1824, and became a lawyer in his native town. He edited the Boston *Courier*, a Whig journal, from 1857 to 1862, and again in later years. Under the administrations of Pres. Taylor and Fillmore he was U. S. district attorney for Massachusetts. He was a man of rich literary culture and of strongly conservative feelings. Between 1839 and 1884 he published six volumes of verse and two novels, besides *Three Eras of New England* (1857) and a work on *Radicalism* (1858). He was best known by his poetry, which is thoughtful and well finished, showing a good degree of vigor and point. The satirical and didactic elements are conspicuous in his work, for he had little sympathy with mere "art for art's sake." He died May 17, 1885.

LUNT, William Parsons (1805–1857), an American divine, was born at Newburyport, Mass., April 21, 1805. He graduated at Harvard College in 1823, and studied law; but in 1828 was ordained to a Unitarian pastorate in New York city. After 1835 he had a pastoral charge in Quincy, Mass., until his death, which occurred at Akabah, on the Red Sea, March 20, 1857. He left some poetical and prose remains, characterized by unusual refinement of style and perfection of form. As a pulpit orator he was highly effective.

LUTHARDT, Christoph Ernst, a German theologian, was born at Maroldsweisach, Bavaria, March 22, 1823. He was educated at Erlangen and Berlin, and studied theology at Munich. After some years spent in teaching he became in 1854 extraordinary professor of theology at Marburg, and in 1856 was made professor of systematic theology and New Testament exegesis at Leipsic. He belongs to Confessional Lutheran school, and has exerted great influence by his books and periodical publications. Among the former are *Das Johanneische Evangelium* (2 vols., 1853); *Die Lehre von den letzten Dingen* (1871); *Die Lehre vom freien Willen* (1863); *Kompendium der Dogmatik* (1865); *Die Ethik Luthers* (1867); *Der Johanneische Ursprung des Vierten Evangeliums* (1874); *Apologie des Christenthums* (4 vols., 1864–80).

See Vol. XV. p. 85 Am. ed. (p. 84 Edin. ed.).

LUTHERANS in the United States. The earliest Lutheran emigrants from Europe to this country came from Holland in 1624, and settled in Manhattan, or New Amsterdam, now New York city. The policy of the Dutch West India Company, in the government of that colony, was short-sighted and illiberal in spiritual matters, forbidding the holding of public worship by any religious denomination except the adherents of the decrees of the Synod of Dort. Rev. Mr. Goetwater, who was sent by the Lutheran Consistory of Amsterdam to minister to these Dutch immigrants in New Amsterdam in 1658, was banished from the city, and it was not until 1664, when the province was wrested from the Hollanders by Great Britain, that the Lutherans were allowed to call a minister. In 1668 Rev. Jas. Fabritius arrived, commissioned by the church authorities in Holland, with the express sanction of the British governor, Col. Nicholls. Services were held for many years among these immigrants in both the Dutch and the French languages (occasionally also in German) by ministers who retained their ecclesiastical relations with the Evangelical Lutheran Consistory in Holland. During the reign of Queen Anne provision was made for the supply not only of churches but also of schools among these Lutheran immigrants and those of the British colonies of the South.

At an early day numbers of German Lutheran immigrants connected themselves with the Dutch church, and at intervals both parties were served by Swedish pastors from the colony on the Delaware. About the middle of the last century the Germans gained the preponderance, and the question of language greatly interfered with the prosperity of the church.

The second emigration of European Lutherans was from Sweden. That great champion of evangelical Protestantism, Gustavus Adolphus, king of Sweden, had long meditated the establishment of a colony in the new world. He was, however, not permitted to carry out his design. But under the direction of his devoted personal friend and prime minister, Axel Oxenstiern, who succeeded him in the administration of the kingdom, the first Swedish colony was planted on the Delaware in 1637, and the first Lutheran churches in this country were built by the Swedes at Christina in Delaware and at Wicaco in Philadelphia, where the "Old Swedes' Church" still stands. These monuments of religious zeal and Lutheran enterprise were viewed at the time with wonder and admiration by the colonists of other sections. "From 1696 to 1786 the Swedish government sent to the churches on the Delaware no less than 24 clergymen, generally giving them an outfit and paying the expenses of their voyage from Sweden to America, as also of their return voyage, when, after many years of faithful labor, they returned to their native land, where they were again received with open arms and often invested with pastorates of the most desirable character." (Dr. Reynolds.)

One of these ministers, Campanius, whose self-denying labors among the Indians were greatly blessed, translated Luther's Catechism into their language. The Swedish government printed it at Stockholm for the use of the missionaries on the Delaware. Campanius began his labors among the Delaware Indians four years before Eliot, "the morning-star of missionary enterprise," did the same in New England (1646). These Swedish churches continued to receive support from the mother country long after the control of the colony passed into other hands; indeed, it was not until, through the disuse of the Swedish language and the absorption of the congregations and their church property by the English Episcopalians, that the connection with the home church was completely severed.

The third tide of European Lutheran immigration to this country was *German.* Occasionally there had been Germans along with the Dutch and the Swedes, and many had settled on the Hudson River. But it was not until after the grant of Pennsylvania to William Penn, in 1680, that the stream turned strongly from Germany in this direction. Oppressed by their rulers at home and attracted by the inducements held out in the calls of Penn for colonists, thousands turned their faces towards the land of promise from the Palatinate, Würtemberg, Baden, etc. Many of these were too poor to pay their passage-money, but obligated themselves to speculating agents of ship-owners (called New-landers) who paid their fare and then repaid themselves by selling the services of these poor "Redemptioners" for a term of years to persons in Philadelphia and the vicinity. So humble was the beginning of a large portion of the German Lutheran population in Pennsylvania.

During the reign of Queen Anne special efforts were made to induce Germans living along the Rhine to go to the British colonies in North America. To a company of 3000, sent to the colony at one time in 1809, Queen Anne gave 2100 acres of land, on which the towns of Newburg and New Windsor have been built, "for the maintenance of Lutheran parish schools and ministers." But this wide and fertile domain was wrested from them by unprincipled speculators, just as was that allotted for a similar purpose by Queen Anne to the German settlers on the banks of the Congaree in the colony of South Carolina.

The fourth wave of European Lutheran immigration was *Tyrolese.* When Leopold, count of Firmian, archbishop of Salzburg, drove away in midwinter some 20,000 of his Protestant subjects, many of them found refuge in different parts of Germany. Rev. Dr. Urlsperger, of Augsburg, interceded for them with the British Society for the Promotion of Christianity, and that association furnished the means of transportation for large numbers of them in 1734 to the colony then being organized in Georgia by Gen. Oglethorpe. A prosperous settlement was established by them at Ebenezer, and they were liberally aided by friends in Germany and England, the British Parliament contributing at one time £20,000.

The German settlement at Waldoborough in Maine, 1738, was less fortunate and was repeatedly devastated by the French and Indians.

Of the hundreds of thousands of Europeans now annually seeking homes among us a very large proportion are Lutherans. All Scandinavia is Lutheran, and these Swedes, Norwegians, and Danes are rapidly filling up many of our North-western States. As a result, mainly, of this enormous immigration the Lutheran Church already ranks fourth, if not third, in point of numbers, among the Protestant denominations of our country.

Supply of Ministers.—The colony of Tyrolean Germans at Ebenezer took with them two faithful pastors, Bolzius and Gronau. The Swedes on the Delaware were furnished with pastors from their native land. But the Germans in New York and Pennsylvania were not thus cared for. Here and there small flocks were gathered, but often by men who cared more for the fleece than for the sheep. Generally the people were as sheep without a shepherd. Affecting appeals were made by some devout Lutherans in Philadelphia in 1732 to Dr. Ziegenhagen, German court-preacher in London, for godly Lutheran preachers to minister to their scattered and neglected brethren here. He then consulted with the Rev. Dr. Francke, founder of the great orphan house at Halle, and in 1741 the Rev. Henry Melchior Muhlenberg entered upon the career of distinguished usefulness that properly characterizes him as the "patriarch of American Lutheranism."

Church Polity.—The Lutheran Church has always held that no specific form of church government is taught in the Scriptures further than the two fundamental principles of the parity of the ministry and the right and the duty of the laity to take part in all ecclesiastical affairs. Thrown by the force of circumstances, at the time of the Reformation, into close and even measurably dependent relations to the state, its church polity was then and has for centuries in Europe been modified by influences uncongenial with its spirit and tendency. In this country, being entirely free from all entanglement with the civil authority, it has been free to develop a system of church government in accordance with its original principles, and this form is a combination of the Presbyterian and Congregational systems. Each congregation is essentially independent, the pastor, elders, and deacons constituting a council that is intrusted by the church with the administration of its affairs. Synods composed of the pastors of a district of country, together with an equal number of delegates appointed by the respective pastoral charges, constitute the highest ecclesiastical court, acquiescence in whose decisions is essential to the honorable recognition of a church as in regular ecclesiastical fellowship. These synods are divided into conference districts, the ministers residing within which, together with the delegates of their churches, meeting several times a year for mutual edification and consultation, holding also special public religious exercises. This system contemplates also a General Synod with merely advisory powers, constituted of representatives of all the district synods, both lay and clerical.

The first synod was organized in 1748 under the title "The German Evangelical Lutheran Ministerium of Pennsylvania and Adjacent States and Territories.' This body is still in existence, though its title has been legally changed by the omission of the word *German,* and its membership is confined mainly to that part of Pennsylvania lying between the Susquehanna and Delaware Rivers.

In the course of time other synods were formed in New York, Ohio, the Carolinas, etc., and in 1820 most of these united in establishing "The General Synod of the Evangelical Lutheran Church in the United States." Before the breaking out of the civil war this General Synod constituted a bond of union including nearly all the older synods, but when that disastrous event occurred the Lutheran churches in the South withdrew from it and organized the "Evangelical Lutheran General Synod in North America." In 1866 the Pennsylvania Ministerium withdrew from the original General Synod and, with several other previously independent synodical organizations, established another delegated body entitled the "General Council." Still another general delegated body exists among the Lutherans in this country entitled the "Synodical Conference." This embraces the eleven district synods composing the so-called Missouri Synod, together with four others. Beside these four general bodies there are twelve independent synods claiming to be Lutheran, but not in ecclesiastical fellowship with any others.

The original General Synod, notwithstanding its losses, still embraces 23 synods, with 866 ministers, 1424 churches, and 135,110 communicants. The General Synod South embraces 6 synods, with 139 ministers, 235 churches, and 18,269 communicants. The General Council embraces 12 synods, with 969 ministers, 2106 churches, and 251,025 communicants. The Synodical Conference embraces 16 synods, with 975 ministers, 1481 churches, and 273,259 communicants. The 12 independent synods have 768 ministers, 1791 churches, and 215,539 communicants. This exhibits a grand total of 3717 ministers, 7037 churches, and 893,202 communicants.

These statistics include two small synods in Canada, one belonging to the General Council and the other to the Synodical Conference.

A Polyglot Church.—This term may be appropriately given to the Lutheran Church in the United States, for no less than seven languages are used in its pulpits—English, German, Swedish, Danish, Norwegian, Finnish, and Icelandic. Whilst all of these nationalities of course prefer to hear the gospel in their vernacular, none of them so stubbornly resist the introduction of the English into their pulpits as do the Germans. The earliest German preachers were highly educated men and sagacious. They cultivated cordial relations with other religious denominations, and soon began to preach in English for their young people. Dr. Kunze preached every Sunday in German, Dutch, and English. Had this policy been steadily pursued the Lutheran denomination would probably now be the strongest among the Protestant churches in this country. But it subsequently became to a great extent a mere feeder for other churches. Unfortunately the learned and liberal-minded men, who so wisely laid the foundation of the Lutheran Church in this country, were unable, amid their manifold and arduous labors, to educate a generation of ministers adequate to the task of properly taking their places. Nor could the parent church in Europe keep pace with the rushing tide of immigration that poured its hundreds of thousands of souls, spiritually uncared for, upon our shores. Thus for more than half a century the pulpits of the Lutheran churches were filled by men who, by the narrowness of their views and the almost exclusive use of the German language, steadily drove their English-speaking hearers into other denominations.

Doctrine.—The Lutheran is the Church of the Augsburg Confession. As such it is known in history, and all who call themselves Lutherans recognize this symbol as their ecclesiastical standard. The doctrinal position of the General Synod is thus defined in its constitution: "All regularly constituted Lutheran Synods not now in connection with the General Synod, receiving and holding with the Evangelical Lutheran Church of our fathers the Word of God as contained in the Canonical Scriptures of the Old and New Testaments, as the only infallible rule of faith and practice, and the Augsburg Confession as a correct exhibition of the fundamental doctrines of the Divine Word, and of the faith of our Church founded upon that Word, may at any time become associated with the General Synod by adopting this constitution and sending delegates."

The General Council in its "Principles of Faith and Church Polity" thus defines its position: "We accept and acknowledge the doctrines of the unaltered Augsburg Confession in its original sense as throughout in conformity with the pure truth of which God's Word is the only rule. We accept its statements of truth as in perfect accordance with the Canonical Scriptures: we reject the errors it condemns, and believe that all which it commits to the liberty of the Church of right belongs to that liberty. . . In thus formally accepting and acknowledging the unaltered Augsburg Confession we declare our conviction that the other Confessions of the Evangelical Lutheran Church, inasmuch as they set forth none other than its system of doctrine and articles of faith, are of necessity pure and scriptural."

The Synodical Conference not only requires subscription to all the symbolical books of the Lutheran Church, viz., the three Œcumenical Creeds, the Augsburg Confession, the Apology, the Smalcald Articles, the Catechisms of Luther, and the Formula of Concord, but it also forbids all ecclesiastical intercourse with other religious denominations, and even with other Lutherans whose explanation of some points of Lutheran doctrine differs from its own.

The independent synods, Danish, Norwegian, Swedish, etc., while somewhat less exclusive than those comprised in the Synodical Conference, are for the most part of the same doctrinal tendency.

No one of these general bodies, or of the independent synods, would consent to be regarded as a sect of the Lutheran Church, or as less truly Lutheran in spirit than the rest. Each of them claims to be, in its own way, the best modern representative of the animus and aims of original Lutheranism. Whilst there is, aside from the diversities of language and of national characteristics, a considerable diversity of theological opinions also among them, there is at the same time manifest a growing tendency in nearly all of them towards the cultivation of a fraternal spirit, and the use of such means as are calculated to prepare the way for an ultimate outward union, upon American soil, of all avowed adherents of the Augsburg Confession.

Beside the churches included in the various synods just mentioned, all of which are more or less strictly orthodox, in the Lutheran sense of that term, there are, in the large cities of the Eastern, Middle, and Western States, numerous so-called Lutheran congregations that have nothing Lutheran about them except the name. They are composed of foreigners who have come from Lutheran districts in Europe where the church-life has sadly degenerated, and where they have not been accustomed to sound Lutheran doctrine or discipline. Free here to do as they please, they hire preachers after their own way of thinking, generally for a year at a time, and thus keep up the forms of religion, caring nothing for personal piety. They are not ecclesiastically recognized by the Lutheran Church in this country, and, of course, are not included in the statistics above given.

Cultus.—From the beginning the Lutheran Church was liturgical in its form of divine worship. Luther simply eliminated from the Romish mass its idolatrous and anti-Christian elements, and retained its other features as well fitted to enhance the solemnity and effectiveness of public worship. The form of service at first used in the Lutheran churches in this country was the so-called Marburg Liturgy. This was variously modified at different times, officially and unofficially, falling in some places entirely into disuse. This want of uniformity induced the several general bodies now embracing most of the English-speaking churches to agree upon a form of worship embodying the consensus of the liturgies employed in the different parts of the Lutheran Church of Europe in the sixteenth century. This form, in substance already agreed upon by the General Synods, North and South, and the General Council, will probably soon find its way, upon its own intrinsic merits, into common use in the English-speaking Lutheran churches in the United States.

Eleemosynary Institutions.—There are *forty-five* institutions of this character, nearly all of which are under immediate ecclesiastical supervision, but a few are under private management. They are Orphans' Homes, Hospitals, Asylums for the Aged, for the Deaf and Dumb, Immigrant Missions, etc.

Educational Institutions.—Originating in deep poverty, and persisting so long in the use of a foreign tongue, the Lutheran Church in this country is only now beginning to take the rank as an educational force to which her European parentage entitles her. Despite her early disadvantages, however, the following exhibit will prove that she is girding herself for the task that Providence has here assigned her. She has already established 19 theological seminaries, with 58 professors and teachers and 431 students; 24 colleges, with 151 professors and teachers and 2532 students; of these 769 are preparing for the ministry; 27 classical seminaries, with 1864 students, 119 of whom are preparing for the ministry. From some of these institutions deficient reports were received, so that the number of students here given is below the mark.

Periodical Publications.—The Lutherans are a reading people, as may be inferred from the number of periodicals circulating among them. Of these there are in English 38, in German 51, in Norwegian 18, in Swedish 7, in Finnish 1, in Danish 4, in Icelandic 1; total 118. Of these 30 are published weekly, 23 semimonthly, 44 monthly, 5 bi-monthly, 7 quarterly, and 11 annually.

Missions.—The Lutheran Church, from the beginning of her history, cherished the true missionary spirit. Luther taught that the gospel must be preached to the heathen. The Lutheran princes heeded this call. Gustavus Vasa, of Sweden, who reigned from 1523 to 1560, established the first effective Protestant missions, viz., among the Laplanders. Danish and German rulers followed suit. The patriarchs of American Lutheranism were filled with the same spirit; and now, though the work of Home Missions—*i. e.*, of providing for the spiritual wants of their brethren in the faith still pouring in upon them at the rate of nearly 1000 every day—is emphatically the first duty of Lutherans in America, they cheerfully take part in the work of the evangelization of the heathen, vigorously carrying on missionary operations both in India and in Africa.

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LUZZATTO, Samuel David (1800–1865), an eminent Jewish scholar, was born at Trieste, in Istria, Aug. 22, 1800. At the age of 15 he published a volume of Hebrew verses, which was soon followed by a pamphlet on the Zohar (see article KABBALAH in ENCYCLOPÆDIA BRITANNICA). In 1829 he was appointed professor of biblical literature in the rabbinical college of Padua, at which place he died, Sept. 30, 1865. Among the Hebrews of Italy in modern times no name is more celebrated than that of S. D. Luzzatto, whose learning and judgment were alike conspicuous. He wrote against the Cabbalists, published some volumes of Hebrew verse and treatises on theology, and prepared various commentaries. His version of the Old Testament in Italian was not quite complete at his death. His son, Philoxene Luzzatto (1829–1854), was distinguished as a polyglot linguist.

LYMAN, Theodore, an American zoölogist, was born at Waltham, Mass., Aug. 23, 1833. He graduated from Harvard College in 1855, and studied under Prof. Louis Agassiz. In 1862–65 he served in the Federal army, chiefly as an officer of Gen. Meade's staff, and attained the rank of lieutenant-colonel of volunteers. From 1865 to 1882 he was on the Massachusetts Fishery Commission, and published various reports on the work of that organization. Besides the excellent *Ophiuroidea of the Challenger Expedition* (1882) he has published many scientific papers, his specialty being the lower invertebrate marine animals. In 1883 he was sent to Congress as an Independent. Mr. Lyman's writings on star-fishes and kindred forms of life are masterly works, and have given him a wide reputation.

LYNCH, Patrick Nelson (1817–1882), an American bishop, was born at Cheraw, S. C., March 10, 1817. He studied theology in a seminary at Charleston and at the college of the Propaganda in Rome. He was ordained to the Roman Catholic priesthood in 1840. After service in the theological seminary at Charleston, of which he was for some time the rector, he received in 1850 the office of vicar-general of the diocese. In 1858 he was consecrated bishop of Charleston. His episcopal labors, as well as his work in his previous offices, were very effective. He exerted himself to procure for the Southern Confederacy the recognition of the pope. After the war he devoted himself to the work of repairing the losses sustained by his diocese. While thus occupied he died, Feb. 26, 1882.

LYNCH, Thomas, Jr. (1749–1779), a signer of the Declaration of Independence, was born in the parish of Prince George, S. C., Aug. 5, 1749. He was educated at Eton and Cambridge, in England, and for some time read law in the Temple, London, returning to his native province in 1772. In 1775 he was appointed to a captaincy in the Eighteenth regiment of provincial regulars, and in 1776 was sent to the Continental Congress as successor to his father, who died that year. The younger Lynch was soon compelled by ill health to resign his seat. In 1779, his health being still bad, he started on a voyage to St. Eustatia, in the West Indies; but the vessel was never again heard from.

LYNCHBURG, a city of Virginia, in Campbell county, is on the right bank of the James River, in a picturesque mountainous region at the foot of the Blue Ridge. The Norfolk and Western Railroad, the Virginia Midland, and the Richmond and Allegheny pass through the city. There are 4 railroad bridges spanning the river, besides a wagon bridge across the James River, and another across Black Water Creek. The Miller Orphan Asylum is located near the city. There are 4 hotels, 5 national banks, 1 weekly and 3 daily newspapers, 17 churches and chapels. There are

3 flour-mills, 2 bark-mills, 2 barytes-mills, 1 furnace, and 1 foundry. There are many tobacco-factories, besides 5 tobacco warehouses, the sale and manufacture of which article is the chief industry of the place. The city is widely spread over hilly ground. It has gas-works, but its streets are lighted by the electric light. It has also water-works and a large park, a portion of which is used as a fair-ground. Lynchburg was incorporated in 1786. The total valuation of property is, real estate, $6,554,876; personal property, $2,040,974. The public debt amounts to the sum of $1,224,000. The population in 1870 was 6825, and in 1880, 15,959.

LYNN, a city of Massachusetts, in Essex county, stands on the sea-coast. Two lines of steam railways and one street railway connect it with Boston, which is 10 miles to the S. W. The principal part of the city is built near the sea; but on the broken and hilly grounds at the rear there are many handsome residences and some industrial works. The city-hall, a handsome structure, contains the free public library of the town. A large proportion of the houses are of wood. Lynn has a high school, many handsome churches, 3 national banks, and several newspapers. It is very prominent as a seat of the manufacture of ladies' and children's shoes, chiefly machine-made. There are also extensive tanneries, chiefly for Morocco and other grades of light leather. Lynn was founded in 1629, and was incorporated as a city in 1850. Population in 1870, 28,233; in 1880, 38,274.

LYON, Mary (1797–1849), a distinguished American teacher, was born in the township of Buckland, Mass., Feb. 28, 1797. She became a teacher when quite young, and early obtained a wide and excellent reputation. From 1824 to 1828 she was employed in the Adams Female Academy at Londonderry, N. H., and from that time till 1834 she was at the head of a school for young ladies at Ipswich, Mass. Her widest reputation was gained while she was at the head of the Mt. Holyoke Female Seminary at South Hadley, Mass., an institution planned and organized chiefly by herself, not without serious opposition, even from some of the warmest supporters of educational progress. She presided over this school from 1837 till her death, March 5, 1849. In this seminary she adopted the plan (still prevailing there, with some modifications) of having all the domestic labor performed by the pupils and teachers. To the religious element in education she gave special prominence. She published in 1840 an explanation and defence of her system of education, and prepared a *Missionary Offering* (1843). See her *Life and Labors*, by Rev. Dr. E. Hitchcock (1851), and Fidelia Fiske's *Recollections of Mary Lyon* (1866).

LYON, Nathaniel (1819–1861), an American soldier, born at Ashford, Conn., July 14, 1819, was a grandnephew of Col. Thomas Knowlton (1740–1776), of Revolutionary fame. Lyon was educated at West Point, graduating in 1841. He won distinction in the Florida and Mexican wars. The outbreak of the war of 1861–65 found him in charge of the arsenal at St. Louis, and his activity and vigilance did much for the Union cause in Missouri. At the head of a body of "Home Guards" he took possession (June 10, 1861) of Camp Jackson, a secessionist rendezvous. A week later he was appointed a brigadier-general of volunteers, and was soon after placed in command of the department. He next dispersed the Confederate force at Potosi, and on June 17 defeated a body of Gov. Jackson's State militia. On Aug. 2 he won a victory at Dry Spring over Gen. McCulloch, and on Aug. 10 he attacked the much larger force of McCulloch and Price at Wilson's Creek. After receiving two wounds he still kept the field; but as he was leading a body of men into action he was struck by a minie-ball and killed. His death was deeply lamented throughout the North. By his will he left his estate to the government. Gen. Lyon was warmly interested in public affairs. A volume of his *Last Political Writings* (1862) contains a sketch of his life and services.

LYONS, Richard Bickerton Pemell, Viscount, an English diplomatist, was born at Lymington, Hants, April 26, 1817. He was a son of Edmund, Lord Lyons (1790–1858), an able admiral, to whose titles he succeeded in 1858. The younger Lord Lyons was bred at Oxford, and went to Athens in 1837 as an attaché of the British legation. He was employed on various diplomatic missions, and was minister to the United States during the eventful years from 1858 to 1865, fulfilling the delicate and often difficult requirements of his position with skill and good judgment. In 1865 he was appointed ambassador to Turkey, and in 1867 was sent to Paris in the same capacity. In 1881 he received the title of Viscount Lyons.

LYTTON, Edward Robert Bulwer-Lytton, Marquis of, an English poet, the only son of Lord Lytton, the novelist, was born Nov. 8, 1831, and received his education chiefly at Harrow and Bonn. In 1849 he entered the diplomatic service, and afterwards held positions in that service in most of the important capitals of Europe. While he was a secretary of the embassy in Paris he inherited his father's estates and titles, and was soon after gazetted as minister plenipotentiary to France. In 1874 he was transferred to Lisbon. He was viceroy of India 1876–1880, during which time Queen Victoria was proclaimed Empress of India (1877). The other events of his administration were the great famine of 1876–78 in the southern provinces and the Afghan war of 1878–80. For this war the Liberals held Lytton responsible. Lord Lytton's earlier and poetical writings were chiefly published under the pseudonym of "Owen Meredith." Among them are *Clytemnestra* (1855); *Lucile* (1860); *Orval* (1869), a poem based upon the *Undivine Comedy* of Zygmunt Krasinski (*q. v.*), and *Fables in Song* (1874). He also wrote a *Memoir of Julian Fane*, the poet (1871), and *The Ring of Amasis* (1863), a romance. In his important *Life and Letters* of his father (1883) he incorporated his father's autobiographical notes.

M.

MacADAM, John Loudoun (1756–1836), a Scottish constructer of roads, was born at Ayr, Sept. 21, 1756. He lived at New York from 1770 to 1783, and was a loyalist during the Revolutionary war. At the close of that contest he returned to his native land, relinquishing the greater part of a large fortune acquired by an uncle who had acted as agent for the sale of prize-ships taken by the British during the war. MacAdam soon after 1810 became known as the inventor of "metalled," or macadamized, roads, and his system rapidly came into favor in Great Britain. In 1827 he became surveyor-general of metropolitan roads. His method consisted of completely covering the road-surface with broken stone, no substratum of larger stones being used. The stones must not exceed 6 ounces in weight; those from 1 to 2 ounces are generally preferred. On some kinds of soil this plan works admirably, but for general use Telford's more expensive method is preferred, in which a rough pavement is laid beneath the broken stone. MacAdam received a government grant of £10,000 for his invention, and declined the honor of knighthood. He wrote *Remarks on Road-Making* (1820) and other works on the same subject. He died Nov. 26, 1836.

McALL MISSION. This Evangelistic mission in France, known also as the "Mission Populaire Evangelique de France," is the largest Protestant mission in France. It comprises 100 stations, where religious services are regularly held, and conducts in connection with these Sunday and industrial schools, Bible classes, mothers' meetings, fraternal societies, depots for the sale of Bibles, lending-libraries, and free dispensaries. Its object is to increase the knowledge of the Bible among the poor and to impress a simple form of Christian faith upon the hearts of the people.

It was started in 1871 by Rev. Robert Whitaker and Eliza McAll. Mr. McAll was a Scotch clergyman in charge of a parish at Hadleigh, England. In August, after the Commune, he and his wife visited Paris, and, wishing to do good, distributed tracts among the Communists. On the last day of their visit a workman accosted Mr. McAll in English, saying: "If any one will come among us teaching a religion, not of hierarchy and superstition, but of reality, and earnestness, and liberty, very many of us are ready to listen." Powerfully impressed by these words and by the eagerness of the people to learn, Mr. and Mrs. McAll returned to England, closed their work, and in November, 1871, moved to Paris to live. Mr. McAll was then fifty years old and spoke very little French. He rented a shop near the Rue de Belleville, one of the worst quarters in Paris, furnished it with chairs, a plain desk, a harmonium, and some paper texts. A sign outside read in French: "Workingmen! Moral Meetings. Entrance Free." The first meeting was held Jan. 17, 1872. When 40 had entered the doors were closed to prevent disturbance. Printed hymns were sung. first by Mr. and Mrs. McAll, then by the people when they had caught the tune, Scripture was read, a few earnest words spoken, and a short prayer offered. The work grew slowly and without systematic support. A few personal friends gave money, and Protestants in Paris offered to assist. The first report, made in January, 1873, records 4 stations, the second 8, the third 11, the fourth 17, the fifth 19. The first report (1872) records 515 sittings, 456 French meetings, of which 90 were children's services, an aggregate attendance of 37,957, books circulated 600, and tracts and Scripture portions distributed 50,000. English meetings were also held and English books loaned. During the second year (1873) 1019 meetings were held, Mr. McAll conducting more than 500 himself, and being assisted by two colleagues. Classes for teaching English, special services for young women, and 8 Sunday-schools were reported; also the first payment for services in an expenditure for board for some of the helpers who were unable to give their entire time. The number of sittings was increased to 1056. In the third year (1874) the attendance averaged 2000 a week, beside 600 at the juvenile meetings; sittings, 1610. Weekly prayer-meetings, soldiers' meetings, Bible classes, and services for students are reported. Eight of the stations held social gatherings to commemorate anniversaries. During the Paris Exposition two services were conducted daily under the direction of the mission, and tracts, portions, and Bibles in 22 languages were sold or given away. In 1878 the first branch mission was established in Lyons. The tenth report (1881) records 56 stations, of which 32 were in Paris and 24 in the 9 branch missions of the provinces, 10,195 sittings, 8508 religious meetings with an aggregate attendance of 642,023; domiciliary visits, 8164; Bibles, portions, and tracts distributed, 240,418; also 20 missionaries, assisted by many helpers, and $44,000 receipts. Free dispensaries were then established.

Up to this time the sole responsibility of the mission rested upon Mr. McAll. Foremost among his helpers was the Rev. George T. Dodds, a young Scotch clergyman, who was a most efficient worker from 1878 until his death in 1882, and to whose efforts much of the extension of the mission during that time is directly due. In 1882 a permanent board of directors was chosen, of which Mr. McAll is honorary president, and a sinking fund was secured to be used in case of an abrupt termination of the work. The board meets weekly and has entire management of the work and affairs of the mission. In 1883 the similar mission of Marseilles, Nice, Cannes, and Corsica, under the direction of M. Reuben Saillens, united with the McAll mission.

The method of work is the outgrowth of the early meetings. The halls are simply furnished, and a worker stands outside to offer tracts and invite passers-by to enter. When they do so, another worker, usually a lady, shows them chairs and offers a hymn-book. This book is published for the mission, the words being in many cases written or translated by Mr. McAll or M. Saillens, and the music adapted by Mrs. McAll. The services are short, varied, and interspersed with hymns. Those interested are encouraged to join Bible classes or fraternal societies. The mission forms no churches, and as most of the converts are ignorant of the Bible, and consequently of a true Christian life, fraternal societies have been organized as a preparation for joining some existing Protestant church. These societies have the following rules: Every member must believe on the Lord Jesus Christ; every member engages to read each day a portion of Scripture, to pray for his associates and to visit them in sickness, and to pay a monthly contribution of at least one penny in behalf of the poor (not members of the society). Except in a few cases of marked distress the mission gives away no money. Bibles are sold or given as a reward for continued attendance. As religious instruction is forbidden by law in the schools, the work among children is made prominent, their classes meeting both on Sundays and Thursdays. All political allusions or religious controversy are forbidden by the authorization to hold meetings granted by the government. By means of a missionary boat services for sailors were held in the French ports during the summers of 1884 and 1885. The first halls were in the poorest districts and reached laborers only, but the new halls, more centrally located, are frequented by liberally educated people. Many Protestants from abroad attend these services.

The workers comprise evangelists, Bible-readers, visitors, doorkeepers, Sunday-school teachers, organists, and colporteurs. The voluntary workers consist of persons of private means who give their entire time and money to the mission, clergymen and laymen of the French Protestant churches, ladies of leisure and noble birth, winter residents, students, etc., who give a portion of their time, and converts who assist as they are able. The salaried workers comprise missionaries employed by the directors and persons of small means who give their entire time and receive a partial support. The small expense of the mission compared with the size of the work accomplished is due to the fact that many of the workers are volunteers. They represent the Presbyterian, Congregational, Episcopal, Methodist, and Baptist Churches, and all other churches known as evangelical. Each hall performs the work of a well-organized church of its size, and the expense of a station varies from $150 to $2000 annually. The support of the mission is derived from direct donations and from auxiliary societies in England and Scotland, from the American McAll Association in the United States, and from committees who receive contributions in Australia, Switzerland, and Canada. Each year the receipts increase, and as the mission shows its usefulness its opportunities multiply and the need of funds and workers increases also. The mission works in harmony with all similar organizations, and has been furnished with books and pamphlets by Bible societies in Scotland, England, and America. It is indorsed by clergymen and laymen of all Protestant churches.

The direct result of the mission is the addition of a large number of converts to the French Protestant churches. Of its undoubtedly great religious influence and strong educational power it is not possible to make a definite statement. Mr. McAll has received two decorations from the government as a "friend of humanity," and the opening of new stations is favored by the authorities as it lessens the requisite number of police in the vicinity. The report for 1884 records 94 stations, situated as follows: Paris, 34; Marseilles, 10; Nice, 2; Cannes, 1; Corsica, 2; Lyons, 4; Bordeaux and Arerchon, 6; Boulogne-sur-Mer, 2; La Rochelle and Rochefort, 2; Lille, Roubaix, Croix, and Dunkirk, 4; St. Etienne, 4; Saintes and Cognac, 2; Toulouse, 3; Montauban, 1; Clermont-Ferrand, 1; Nantes and St. Nazaire, 2; Algiers, 2; and 12 new stations. Also sittings, 15,135; meetings, 14,651; attendance, 902,121; domiciliary visits, 19,465; Bibles, tracts, etc., distributed, 564,253. Receipts in round numbers from England, Ireland, and Wales, $15,500; Scotland, $14,500; United States, $21,300; Australia and Canada, $1400; France, Switzerland, and general sources, $7300; total, $60,000. The increase in attendance during the year 1885 was 80,000. The mission publishes tracts, pamphlets, etc., and since January, 1879, a *Quarterly Record, The McAll Mission in France*, of which the annual report forms one number. (C. S.)

McCALL, George Archibald, an American general, was born in Philadelphia, March 16, 1802. He graduated at West Point in 1822; served with great distinction in the Florida and Mexican wars, and resigned from the army in 1853. On the outbreak of the war of 1861–65 he organized the Pennsylvania Reserve corps of 15,000 men, and re-entered the service as a brigadier-general of volunteers. He was placed at the head of the Pennsylvania Reserves as division commander, and planned the movement which resulted in the brilliant action at Dranesville, Va., Dec. 30, 1861. During the "seven days' fight" before Richmond (June, 1862) he won great distinction. On the 30th of that month he was taken prisoner, and the rigors of the short confinement that followed so impaired his health that he resigned his commission, March 31, 1863. His *Letters from the Frontiers* (1868) contain entertaining and valuable accounts of his early army life. He died at West Chester, Pa., Feb. 25, 1868.

McCARTHY, Justin, an Irish author and statesman, was born at Cork, Nov. 22, 1830. In 1853 he became a journalist at Liverpool, and in 1860 removed to London. He spent a number of years in the United States, but in 1879 was elected to Parliament as member for the county of Longford, since which time he has been several times re-elected. In Parliament he has taken an influential position as a Home-Ruler. Among his novels are *My Enemy's Daughter* (1869); *Lady Judith* (1871); *Dear Lady Disdain* (1875); and *Miss Misanthrope* (1877). His other writings include a meritorious *History of Our Own Times* (1878–80); *A Short History of Our Own Times* and a *History of the Four Georges* (1884).

McCLELLAN, George, a skilful American surgeon, was born at Woodstock, Conn., Dec. 23, 1796. He graduated at Yale College in 1816 and in 1819 took the degree of M. D. at the University of Pennsylvania. In 1825 he became one of the founders of Jefferson Medical College, Philadelphia, in which he was professor of surgery from 1826 to 1838. He was also one of the originators of Pennsylvania Medical College, where he held a professorship from 1839 to 1843. He was an excellent and popular lecturer, an able clinical instructor, and an unusually bold and successful operator. His *Principles and Practice of Surgery* was published after his death, which occurred at Philadelphia, May 7, 1847.

McCLELLAN, George Brinton (1826–1885), an American general, son of the preceding, was born at Philadelphia, Dec. 3, 1826. He entered the University of Pennsylvania in 1840, and two years later he became a cadet in the U. S. Military Academy at West Point, being the youngest in his class. By perseverance, application, and uniform good conduct he maintained a high place, and on graduation in 1846 stood second in general rank and first in engineering. Being made brevet second lieutenant of engineers, his first employment was in the Mexican war. He arrived at Monterey in October, 1846, but in January, 1847, left to join Gen. Scott. McClellan took part in the siege of Vera Cruz, being a junior in the little body of engineers, which contained also R. E. Lee and Beauregard. At Cerro Gordo McClellan won commendation, and after Scott's army entered the valley of Mexico he took part in the battles of Contreras and Churubusco, for which he received the brevets of first lieutenant and of captain. He was stationed at West Point until June, 1851, and early in 1852 was sent under Capt. R. B. Marcy to explore the Red River. In April, 1853, he was transferred to the survey of a route for a Pacific railroad from Puget Sound to St. Paul on the Mississippi. He was specially employed in exploring the Cascade Mountains, and his report, made Feb. 25, 1854, appears in Vol. I. of the *Pacific Railroad Survey*, issued by the government.

In 1854 the Crimean war rudely dispelled a dream of universal peace. The U. S. government determined to send a commission to examine the military systems of Europe and to report plans for improving the organization of the American army. The commission consisted of Major Delafield of the engineers, Major Mordecai of the ordnance, and McClellan, now captain. Though received with courtesy in all places they were not permitted to examine the fortifications of Sebastopol nor the French camp; but they inspected the English, Sardinian, and Turkish camps, and the most important military and naval establishments of Europe. Capt. McClellan's report was published by the U. S. government in 1857, and republished in 1861 under the title, *The Armies of Europe.*

In January, 1857, Capt. McClellan resigned from the army to become chief engineer of the Illinois Central Railroad, then just opened. He was soon made vice-president of the company, and had charge of all its business in Illinois. This position he resigned in August, 1860, on being appointed president of the Ohio and Mississippi Railroad. While connected with the former road he resided at Chicago, and he now removed to Cincinnati. In May, 1860, he had been married to the daughter of Col. R. B. Marcy, his former commander in Texas.

The attack on Fort Sumter in April, 1861, roused the people of the Northern States to the necessity of enforcing by arms the supremacy of the Union. Gov. Dennison, of Ohio, summoned McClellan to direct the organization of the volunteers already offering their services, and on April 23, 1861, commissioned him major-general of the Ohio militia volunteers. Soon the general government assigned to him command of the "Department of the Ohio," including also the troops of Indiana and Illinois. His chief rendezvous was at Camp Dennison in Ohio, but there were camps at various points along the Ohio River. On May 26 two Ohio regiments were ordered to cross into Virginia to support the Union men of that State who had organized a regiment at Wheeling. On this occasion McClellan issued a proclamation to the Union men of Western Virginia as well as one to his own troops. Both proclamations show a strong feeling of devotion to the Union, but an equally strong determination to prevent interference with slavery. Whatever may have been McClellan's personal feelings in regard to that institution, he evidently from first to last regarded it as so hedged about with constitutional and legal guarantees that on Southern soil it was to be regarded as sacred as the Union itself.

McClellan remained at Cincinnati, organizing his department, until June 20, when, learning that Gen.

Robert S. Garnett was in command of the Confederate troops in West Virginia, he hastened to take the field. His subordinates, Rosecrans at Rich Mountain, July 11, and Morris at Carrick's Ford, July 13, completely defeated the Confederates. Gen. Garnett was killed, and Col. Pegram surrendered with 600 men.

On July 21 the Union army which, with full assurance of victory, under Gen. Irwin McDowell, had marched from Washington, suffered a humiliating defeat at Bull Run. Washington was panic-stricken, and the hero of the mountain campaign in West Virginia was with universal approbation called to the defence of the national capital.

Gen. Winfield Scott, the veteran hero of two wars, still held the chief command of the army, and had advised the calling of McClellan. The latter, now in his thirty-fifth year, assumed command July 27, 1861. In a public speech he promised that the war should be "short, sharp, and decisive." But his troops were a confused mass of 50,000 men, of whom less than 1000 were cavalry, and 650 artillerymen with thirty cannon. Discipline was the first requisite, and McClellan, in accordance with Scott's anticipations, proved a capable organizer. Under his direction the morale of the troops was improved, provision was made for adequate artillery and engineer establishments, and for thorough organization of the cavalry. For the defence of Washington an elaborate system of fortifications was erected, so formidable that they were never seriously assailed. But the construction of earthworks and the thorough drilling and organizing of troops consumed months. The people of the North were still anxiously waiting for a forward movement, but the only encounters with the enemy resulted in a defeat at Dranesville and a slaughter at Ball's Bluff. In January, 1862, Edwin M. Stanton became secretary of war, and soon began to urge an aggressive movement. McClellan had, immediately after being summoned to Washington, prepared a memorandum on the conduct of the war, in which he estimated 273,000 men as necessary for the main army operations, apart from those needed for the defence of Washington and the Potomac River and for military movements in the West. His army never reached the number asked for, but in February, 1862, the Army of the Potomac had present for duty 185,420 officers and men with 534 pieces of artillery. At that time the Confederate Army of Northern Virginia had present for duty only 47,617, though the total enrolled was 84,222. Pres. Lincoln had ordered a general forward movement of all the U. S. forces, land and naval, on February 22, but McClellan objected, and finally proposed a movement from Fortress Monroe as a base. For the satisfaction of the President the plan was submitted to a council of division commanders, who approved it by a vote of eight to four. The increasing want of harmony and confidence between McClellan and the administration bore evil fruit. In March the President relieved McClellan of the command of the other departments that he might devote all his energy to the campaign against Richmond.

Gen. McClellan reached Fortress Monroe April 2, 1862, with about 60,000 men. The rest of his force soon followed, making in all 121,500 men, though McDowell's corps, which he had expected, was by the President's injudicious order detached. Gen. J. B. Magruder, of the Confederate army, held Yorktown with about 15,000 men, and though his earthworks were strong McClellan by a prompt movement could have seized these with little loss of life. But on April 6 Gen. Johnston reached Yorktown with heavy reinforcements. McClellan, therefore, decided to reduce the works by a regular siege. The army labored for a month in construction of batteries, but on the night of May 3 the Confederates evacuated their works. Rain, mud, and the want of knowledge of the country prevented effectual pursuit of the enemy, yet Hooker overtook them at Williamsburg. In the gallant action on May 5 there, Gen. Hancock made a decisive bayonet charge, and during the following night the enemy evacuated their positions, leaving many of their wounded to become prisoners of war.

On May 20 the advance of the Union army reached a point on the Chickahominy, eight miles from Richmond, which was then but poorly defended with earthworks. On the 27th Fitz John Porter defeated a force of the enemy at Hanover Court House and destroyed their camp. But every movement of the Union troops was greatly impeded by the incessant rain and by the marshy nature of the country. On May 31 the two corps of the army which had crossed the Chickahominy were heavily assailed by nearly the whole Confederate force. Outnumbered, the Union forces were at first driven back, but, being reinforced by Gen. Sumner, reoccupied much of the ground they had lost. Almost within sight of Richmond, the victorious army was doomed to spend nearly a month in inactivity in a swampy and malarious region. After being decimated by fevers and disheartened by idleness, the army on June 26 entered on the "Seven Days' Fight," a succession of severe and bloody contests, the result of which was that McClellan's army, after losing great numbers of its best men and vast amounts of supplies, sought refuge on the banks of the James River. The great battle of Malvern Hill, the last struggle of the memorable "Seven Days," was really a tremendous defeat to the Confederates. Throughout the week the Union troops had fought gallantly, and more than once had gained splendid advantages; but all the aggressive generalship had been on the Confederate side. After Malvern Hill a bold push to Richmond could hardly have failed of success. But McClellan had made up his mind for defeat, and depended for the safety of the army on the gunboats in the James. In letters at this time he threw the blame of his failure on the President and secretary of war, discussed the political problems of the time, and again warned the President against interfering with slavery.

The army, still nearly 90,000 strong, remained inactive at Harrison's Landing until Aug. 24, when, owing to a sudden movement of the Confederates on Washington, McClellan was recalled to the vicinity of that city by Gen. Halleck, now general-in-chief. The second disastrous battle of Bull Run soon compelled a retreat of all the Union troops to the lines of Washington. Upon Lee's invasion of Maryland, in September, 1862, Pres. Lincoln took the responsibility of restoring McClellan to full command. At South Mountain, on the 13th, the Confederates were defeated, and at Antietam Creek, to which they had been driven, a sharp and bloody battle was fought. Yet it was indecisive through McClellan's neglect to avail himself of all his resources and advantages. On the next day Lee recrossed the Potomac in safety, while McClellan waited three weeks to reorganize his army. Scarcely had he crossed the river when, on Nov. 7, he was relieved of the command, which he never again assumed. In 1864 he published the report of his campaigns, and in the last year of his life he again presented a justification of his course.

The political aspect of his conduct while in command had won the favor of Democratic leaders, and especially his effort to preserve, in time of war, all the restrictions of peace. Their National Convention in 1864 nominated him for President. The election was confined to the Northern States, and though his ticket obtained 1,808,725 votes it carried but three States, with twenty-one electoral votes. He resigned his commission in the army on the day of the election, and afterwards went to Europe. After his return in 1868 he resided at Orange, N. J., and was engaged in important engineering works. He was for some time superintendent of docks and piers in New York city. In 1877 he was elected governor of New Jersey. He died suddenly at Orange, Oct. 29, 1885.

McCLERNAND, John Alexander, an American general, was born in Breckenridge county, Ky., May 30, 1812. In early youth he removed to Shawneetown, Ill., where he was admitted to the bar in 1832, and afterwards engaged in journalism. He was a volunteer in the Sac and Fox war, and sat in Congress from 1843 to 1851 as representative of the Shawneetown district, after which time he represented the Springfield district until 1861, when he resigned to take command in the Federal army. In Congress McClernand was a Democrat of moderate independent views, frequently voting, in the latter years of his service, against the extreme pro-slavery measures. In 1861 he was appointed a brigadier-general of volunteers. His valor and energy were conspicuous at Belmont and Fort Donelson, and won his promotion to be a major-general in 1862. At Shiloh he led a division which gallantly withstood a tremendous attack of the Confederates. On Jan. 4, 1863, he assaulted and took Fort Hindman at Arkansas Post, with nearly 5000 prisoners. He won further distinction at Port Gibson. Gen. Grant, in his account of the battle of Champion's Hill, blames McClernand for lack of energy and promptness. He had a command before Vicksburg, where he was placed on the left of Grant's lines. His mistaken report that his assault of May 22 had been successful in gaining the Confederate intrenchments led to other errors and to a useless waste of life. In June McClernand without Gen. Grant's knowledge issued a congratulatory order to his corps, and in violation of orders had it published in Northern newspapers. It did injustice to the other troops engaged in the campaign, and Grant on reading it relieved McClernand of his command. This was an inglorious termination of a campaign in which his political friends had expected that he should supersede Grant. McClernand afterwards had command of various posts on the Texas coast, and still later led the Thirteenth corps in Louisiana, but left the service in 1864.

McCLINTOCK, Sir Francis Leopold, a British admiral, was born at Dundalk, Ireland, in 1819. When twelve years old he entered the navy. In 1848 he served as a lieutenant under Sir James Ross in the first expedition in search of Sir John Franklin, and in 1849 made with Ross a severe sledge-journey along the coast of North Somerset Island. He was in Austin's expedition of 1850–51, and led a celebrated sledge exploration to Melville Island, marching more than 770 miles in 81 days. He bore a distinguished part in Belcher's expedition of 1852–54, in which he commanded the steam-tender Intrepid, and led a sledge-party 1328 miles in 105 days. In 1857 he sailed in command of the yacht Fox, sent by Lady Franklin in further search for her husband, and found many relics and some records of Franklin's expedition, among which was a memorandum giving the circumstances of Franklin's death. McClintock was knighted in 1860 and promoted in 1871 to be a rear-admiral. He published *The Voyage of the Fox* (1860).

M'CLINTOCK, John (1814–1870), an American theologian, was born in Philadelphia in 1814. He graduated at the University of Pennsylvania in 1835, and entered the ministry of the Methodist Episcopal Church. In 1837 he was called to the chair of mathematics in Dickinson College, and in 1839 accepted the professorship of ancient languages in the same college. He edited the *Methodist Quarterly Review* with marked ability from 1848 to 1856, and was president of Drew Theological Seminary at Madison, N. J., from 1867 till his death, which occurred March 4, 1870. He prepared, with Prof. Crooks, a well-known series of Latin and Greek school-books. He was one of the translators of Neander's *Life of Christ*, and edited a translation of Bungener's *History of the Council of Trent* (1855). He published an *Analysis of Watson's Institutes*, *Sketches of Eminent Methodist Ministers* (1854), and other works, but is best known as one of the editors of M'Clintock and Strong's *Theological and Biblical Cyclopædia* (10 vols.), of which 3 volumes were issued before his death.

McCLOSKEY, John (1810–1885), an American cardinal, was born at Brooklyn, N. Y., March 20, 1810. He studied in the college and theological seminary at Emmittsburg, Md., and in 1834 was ordained to the priesthood in New York, after which he studied at Rome and in France. In 1841–42 he was president of St. John's College, Fordham, and in 1843 he was consecrated to a titular bishopric and made coadjutor to Bishop Hughes, of New York. In 1844 he was translated to the new diocese of Albany, where his episcopate of 17 years was very fruitful. He built the cathedral at Albany, established the theological school at Troy, and greatly forwarded the interests of his church in many ways. In 1864 he succeeded Dr. Hughes as archbishop of New York. Here he built the splendid cathedral church of St. Patrick. In 1875 he was created a cardinal-priest. He was the first cardinal who has resided on the American continent, and, excepting some prelates of Spanish-American birth, was the first American ever raised to the cardinalate. He died at New York, Oct. 10, 1885.

McCOOK, the name of a family distinguished in American history for the valor and military talents of several of its members. The eight sons of Major Daniel McCook (1796–1863), who himself fell in the civil war, were all soldiers in that contest, and three of them were killed. Among them were the following: 1. Alexander McDowell McCook was born in Columbiana co., Ohio, April 22, 1831, and was educated at West Point, where he became an instructor in tactics. In 1861 he became colonel of the first Ohio volunteers; was appointed a brigadier-general in the same year; commanded a division at Shiloh and Corinth; led the First corps at Perryville and the Twentieth at Stone River and Chickamauga. 2. Dan McCook (1834–1864) attained the rank of brigadier-general and was killed at Kenesaw Mountain, July 17, 1864. 3. Edwin Stanton McCook (1840–1873) was a soldier and brevet brigadier-general in the Union army, and was afterwards secretary of Dakota; he was murdered at Yankton in 1873. 4. Robert Latimer McCook (1827–1862) was a very successful lawyer at Columbus, Ohio, and entered the volunteer army in 1861. He won great distinction by his bravery and activity, and within a year was made a brigadier-general and division commander. He was captured by bushwhackers while lying sick in an ambulance near Salem, Ala., Aug. 6, 1862, and was murdered by them. 5. Robert S. McCook, born in 1839, graduated in 1859 at the naval academy and served with great credit in the naval operations of the war.

McCOOK, Henry Christopher, an American naturalist and clergyman, a cousin of the "fighting McCooks," was born at New Lisbon, Ohio, July 3, 1837. He graduated in 1859 at Jefferson College, Canonsburg, Pa., and studied theology in the Presbyterian seminary at Allegheny. In 1869 he was called to a pastorate in Philadelphia. Among his books on religious subjects are *Object and Outline Teaching* (1871); a *Teacher's Commentary* (1871–72); *Women of the Bible* (1885); and other works. His scientific writings are of high and well-recognized value. Among his books of this class are *Mound-making Ants* (1877); *Agricultural Ants of Texas* (1880); *Honey and Occident Ants* (1882); and *The Tenants of an Old Farm* (1884). Dr. McCook is an entomologist of great reputation, his special studies being chiefly devoted to ants and spiders.

McCOSH, James, a Scotch-American philosopher and educator, was born in Ayrshire, Scotland, in 1811, and studied at the universities of Glasgow and Edinburgh, where a paper of his on the *Philosophy of the Stoics* obtained for him the honorary degree of M. A., through the influence of Sir William Hamilton. In 1835 he was ordained a minister of the Church of

Scotland at Brechin, but in 1843 he joined in the Free Church movement. In 1851 he was called to the chair of logic and metaphysics in the Queen's College at Belfast, where he remained until 1868, when he was elected president of the College of New Jersey at Princeton. By his liberal views he infused new life into this venerable college, and by personal influence secured for it ample benefactions. Among his writings are *The Methods of Divine Government, Physical and Moral* (1850); *Typical Forms and Special Ends in Creation* (1856); *Intuitions of the Mind Inductively Investigated* (1860); *An Examination of Mills' Philosophy* (1866); *Laws of Discursive Thought* (1869); *Logic* (1869); *Christianity and Positivism* (1871); a work on *The Scottish Philosophy* (1874); and a number of papers and treatises on education and on the relations of science to religion. As a philosopher Dr. McCosh belongs to the Scottish or "common-sense" school, and his writings are notable alike for acuteness and for clearness of vision and perspicuity of statement.

McCULLOCH, Ben (1814–1862), a Confederate general, born in Rutherford co., Tenn., in 1814. He became distinguished in early life for his prowess as a huntsman. He fought in 1836 at the battle of San Jacinto in Texas, and in the Mexican war of 1846–47 won distinction as an officer of the Texas Rangers. He then entered political life, and held various appointments under the United States government. As an officer in the Confederate cause he received in 1861 the surrender of Gen. Twiggs, at San Antonio. He was soon after made a brigadier-general. He fought Gen. Lyon at Dug Springs, Mo., and was defeated; but with Gen. Price he won the battle of Wilson's Creek. McCulloch led a division at the battle of Pea Ridge, Ark., where he was killed, Sept. 7, 1862.

McCULLOUGH, John (1837–1885), an American tragedian, was born at Coleraine, Ireland, Nov. 22, 1837. He emigrated to Philadelphia in 1852, and was employed as a chairmaker. After some experience as an amateur actor he was employed in the Arch Street Theatre and in 1858 attracted the notice of Edwin Forrest, who invited McCullough to play in his support. For seven years they continued together and McCullough acquired, in a marked degree, Forrest's tragic style. In 1866 they went to San Francisco together, but when Forrest returned to the East McCullough remained and began to play the characters formerly assumed by Forrest. In 1869 McCullough became manager of the new California Theatre, but after two or three years of prosperity became deeply involved in debt. He had also acquired convivial habits which made him a social favorite but eventually proved his ruin. When Edwin Forrest died in 1872, McCullough was recognized as his successor though not his equal in tragedy. For ten years he had uniform success in such characters as Virginius, Othello, and Richelieu. In 1881 he appeared in England and maintained the reputation he had won on the American stage. In 1883 his health began to give way and he was advised by his physicians to retire from the stage. He persisted, however, in his work, but his mind became impaired and after many failures he completely broke down in Chicago, where he appeared for the last time Sept. 29, 1884. He was not put under restraint but wandered over the country for some months later. He died in New York city, Nov. 8, 1885.

McDONALD, George, a British novelist and poet, was born at Huntly, Aberdeenshire, in 1824. He graduated at King's College, Aberdeen, and after studying theology in the Independent College at Highbury, near London, entered the Congregationalist ministry. He afterwards became a lay member of the Church of England, and pursued a literary career in London. His first book was a dramatic poem, *Within and Without* (1856). This was followed by a large number of tales, poems, and books for children. Among his novels are *David Elginbrod* (1862); *Alec Forbes of Howglen* (1865); *Annals of a Quiet Neighborhood* (1866); *Seaboard Parish* (1867); *Robert Falconer* (1868); *Wilfrid Cumbermede* (1871); *Thomas Wingfold, Curate* (1876); *The Marquis of Lossie* (1877); *Guild Court* (1867); *Malcolm* (1874); *St. George and St. Michael* (1875); *Sir Gibbie* (1879); *Paul Faber, Surgeon* (1878); *Castle Warlock* (1882); etc. He also published *Unspoken Sermons* (1866); and *The Miracles of our Lord* (1870). In 1877 he received a pension of £100, in consideration of his literary services. Mr. McDonald's best work has many fine qualities. His tales are full of poetry, and of high moral and religious purpose. Some of his descriptive passages are of almost unequalled excellence. The strength of his fiction lies in the characters rather than in the plots. His personages, for the most part, impress us as real human beings who have had a history. His works abound in sentences and sayings worthy of being remembered, and volumes might be compiled of his noteworthy and quotable passages. Mr. McDonald has been happily described as "a cross between a poet and a spiritual teacher." Yet some of his best work has a prismatic distortion, and even his moral elevation and poetic fervor have a certain wearisome sameness. His dialogue parts are often in the north-country Scottish dialect, which few of his readers are familiar with. His style of entertainment is seldom light and easy. Yet with whatever faults they are burdened, McDonald's fictions will always be sources of light and of inspiration to many earnest spirits. His poetry has the same high moral qualities as his prose, but it often lacks perfection of form and finish.

MACDONALD, Sir John Alexander, a Canadian statesman, was born Jan. 11, 1815. He studied at the Royal Grammar School, Kingston, and in 1835 was called to the bar. In 1844 he was elected to the parliament of Upper Canada, as a conservative, and for many years was the representative of the city of Kingston in that body. He soon rose to a prominent position in the parliament, and in 1847 he was made receiver-general and a member of the executive council, and later in the same year became commissioner of crown lands. In 1850 he left the cabinet, when the liberals came into power. From 1854 to 1862 he was attorney-general, and during a part of that time he acted as premier. In 1862 he held for some time the position of minister of militia, but on the defeat of the militia-bill of that year he resigned office, and remained in the opposition until May, 1864, when he resumed office as attorney-general. He took an active part in the combination of leaders of both parties for the purpose of effecting the federation of the British North American provinces. In 1866 he was one of the delegates appointed to confer with the Imperial government on the terms of confederation and presided at the meetings of the delegates in London. When the Dominion government was first organized he was sworn of the new privy council and appointed minister of justice and attorney-general, but in 1873, in consequence of the troubles of the Canadian Pacific Railway, he left office. In 1871 he was a member of the joint high commission from whose labors the treaty of Washington resulted. In October, 1878, he was appointed premier of the Dominion government, holding the office of minister of the interior. He was knighted and made a K. C. B. in 1867. For many years he has been one of the recognized leaders of the conservative party in Canada, and especially in the province of Ontario. His great ability as a debater and as a political tactician and his skill in the conduct of public business have given him a prominent place among the public men of Canada. His energy and determination carried forward the construction of the Canadian Pacific Railway, against great political and financial obstacles. To his efforts is due the adoption of the protective tariff, which has stimulated manufactures and greatly improved the financial condition of the country.

McDONOUGH, Thomas (1783–1825), an American naval officer, was born in New Castle co., Del., Dec. 23, 1783. He joined the navy as a midshipman in 1800, and served against Tripoli in 1803–4. On Sept. 11, 1814, he commanded the flotilla in the brilliant contest on Lake Champlain, in which the superior British force under Commodore Downie was signally defeated off Plattsburg, N. Y., at which town Gen. Macomb on the same day repulsed Sir George Prevost. McDonough and Macomb each received from Congress a medal for the exploits of that day, and McDonough was promoted to be a captain. He died at sea, Nov. 16, 1825.

McDOWELL, Irwin (1818–1885), an American general, was born at Columbus, Ohio, Oct. 15, 1818. He was educated at Troyes, in France, and at the military academy at West Point, graduating in 1838. He won distinction in the Mexican war, and had the chief command at the first battle of Bull Run, July 21, 1861. Under Gen. McClellan he commanded the First corps of the Army of the Potomac, and under Pope he led the Third corps in the summer of 1862. He afterwards commanded on the Pacific coast, and in 1868 was transferred to the Department of the East. He died at San Francisco, May 5, 1885.

McDUFFIE, George (1788–1851), an American political orator, was born in Warren co., Ga., in 1788. He graduated in 1813 at South Carolina College, Columbia, and became a lawyer at Edgefield, S. C. He was in Congress from 1821 to 1835, when he was chosen governor of his State. In this capacity he reorganized the College of South Carolina. He was U. S. Senator from 1843 to 1846, when he resigned his seat. McDuffie was a strong supporter of the nullification doctrines of his State and his times, and a violent enemy of the policy of protection. He was a very ready and eloquent debater, and was an extremely effective popular speaker. An early volume of his, called *The Crisis*, is remarkable as a defence of the very doctrines he afterwards so strongly opposed. He died March 11, 1851.

McGEE, Thomas D'Arcy (1825–1868), an Irish journalist and author, was born at Carlingford, April 23, 1825. He lived for some time in Boston, Mass., where he edited *The Pilot*, a Roman Catholic weekly. He afterwards was a journalist of London and Dublin, where he edited the *Nation* newspaper, and was prominent in the agitations of 1848, in which year he was compelled to leave the country. He next edited the *Nation* and the *American Celt* in New York; but the sudden rise of the Native American movement gave him such a disgust of republican ideas that he retired to Montreal, and became editor of the *New Era*, a royalist journal. He held various positions under the government, and in 1867 was made minister of agriculture. He strongly opposed Fenianism, and was in consequence assassinated by James Whelan, at Ottawa, April 7, 1868. Among his publications are *Irish Settlers in America* (1851); *The Protestant Reformation in Ireland* (1853); *Catholic History of North America* (1854); *Canadian Ballads* (1858); *History of Ireland* (1862), and other works.

MacHALE, John (1791–1881), an Irish archbishop and author, was born at Tubbernavine, County Mayo, in 1791. He was educated in the Roman Catholic College at Maynooth, where in 1814 he was appointed professor of theology. He was raised to the episcopate in 1825, and in 1834 became archbishop of Tuam. His activity in politics, in the cause of Catholic emancipation, in polemics, in church building, in the establishment of parish schools, and in opposing the government system of education was marvellous. He had wonderful popularity and influence with the Irish people of his own faith. He strove zealously to rehabilitate the old Irish language as a literary vehicle, translating into it with his own hand many of Moore's *Melodies*, six books of the *Iliad*, and a good part of the Bible. He died Nov. 8, 1881.

McILVAINE, Charles Pettit (1798–1873), an American divine and author, was born at Burlington, N. J., Jan. 18, 1798. He graduated at Princeton in 1816. He was ordained and settled at Georgetown, D. C., and in 1825 was appointed chaplain and professor of ethics at West Point. He afterwards became rector of St. John's Church, Brooklyn. In the winter of 1831–32 he delivered a series of lectures on the "Evidences of Revealed Religion," at the University of the City of New York, then just commencing. In the same year he was consecrated Protestant Episcopal bishop of Ohio, and took up his residence in Cincinnati. Here among other works he published addresses in opposition to the doctrine of the Oxford Tracts, and a volume of sermons entitled *The Truth and the Life* (1855). His work on the *Evidences of Christianity* (1832) had a great success, has passed through more than 30 editions, and has been republished in London and Edinburgh. In 1853 the University of Oxford conferred on him the degree of D. C. L., and in 1858 the University of Cambridge that of LL. D. During the civil war he was an active member of the Christian and Sanitary Commissions, and went to England in their behalf. As president of the American Tract Society he visited Russia in 1871, to intercede with the czar in favor of the religious rights of his Protestant subjects. He died during this journey at Florence, Italy, March 13, 1873.

McINTOSH, the name of a distinguished family of Georgia, whose members have been prominent in American history from an early period. The head of the family, John More McIntosh, was chief of the Borlan branch of Clan McIntosh, of Scotland. He accompanied Oglethorpe to Georgia in 1736 with 100 of his tribesmen, and settled at New Inverness (now Darien), in what is now McIntosh county. His son, Lachlan McIntosh (1727–1806), was born at Borlan, Scotland, March 17, 1727. He occupied a prominent position in Georgia affairs, and originated the protest of the colonists against the introduction of African slaves. He became a brigadier-general in the Revolution, commanded the Western Department in 1778, led an expedition against the Ohio Valley Indians, and took an active part in the siege of Savannah, where he was made prisoner by the British. He was a member of the Continental Congress of 1784, and commissioner to treat with the Southern Indians in 1785.

John McIntosh, brother of Lachlan, also served in the Revolution, as lieutenant-colonel. He became major-general of Georgia militia in the war of 1812. Seven of the McIntoshes in all are said to have served in the Revolutionary war. Col. James McIntosh, son of John, served with distinction as lieutenant in the war of 1812. He afterwards served on the Canadian frontier, in the Creek war, and in Mexico, where he commanded a brigade. He was mortally wounded at Molino del Rey, in 1847, while leading the assault. His son, James McIntosh, graduated at West Point, 1849, and served as general in the Confederate army. He was killed at the battle of Pea Ridge, Ark., Nov. 7, 1862.

Maria J. McIntosh, the grandniece of Gen. Lachlan, well known as a popular writer of fiction, was born at Sunbury, Ga., in 1803. She removed to New York in 1835, lost her fortune in the panic of 1837, and turned to literature as a means of livelihood. Her first work, a juvenile, *Blind Alice*, published 1841, met with great success, and was followed by several other juvenile tales. These were issued under the pseudonym of "Aunt Kitty." In 1844 she began to write for mature readers, and published numerous works, of which *Two Lives, or to Seem and to Be*, was the first issued under her own name. Of these works may be named *Praise and Principle*, *Charms and Counter Charms*, *Donaldson Manor*, *Woman in America*, *Emily Herbert*, *Violet, or the Cross and the Crown*, and *The Lofty and the Lowly* (1856). The last was intended as a reply to Mrs. Stowe's *Uncle Tom's Cabin*.

MACKAY, Charles, a Scottish poet and song-writer, was born at Perth in 1814. He served on the staff of the *London Morning Chronicle* from 1834 to 1843, and edited the *Glasgow Argus* from 1844 to 1847. He was afterwards long connected with the *London Illustrated News*, founded the *Review* in 1860, and served in the United States as war correspondent of the *London Times* from 1862 to 1865. He has been a voluminous writer, his principal works being *Songs and Poems* (1834); *History of London* (1837); *The Thames and its Tributaries* (1840); *The Hope of the World* (1840); *Memoirs of Extraordinary Popular Delusions* (1841); *Legends of the Isles* (1845); *Education of the People* (1846); *The English Lakes* (1846); *Voices from the Crowd* (1846); *Voices from the Mountains* (1847); *Town Lyrics* (1848); *Egeria* (1850); *The Lump of Gold* (1855); *Under Green Leaves* (1857); *A Man's Heart* (1860); *Studies from the Antique* (1864); *Under the Blue Sky* (1871); *Lost Beauties of the English Language* (1874). He is best known by his songs, some of which have been very popular, such as "The Good Time Coming." The music of some of them was composed by himself. He has been more recently engaged in writing a work on *The Gaelic Etymology of the English Language.*

McKEAN, Thomas (1734–1817), an American Revolutionary patriot and signer of the Declaration of Independence, was born in Chester co., Pa., 1734. He was admitted to the bar in 1757, and held important trusts in Pennsylvania and Delaware, from which latter State he was sent to the general Congress of 1765—the "Stamp Act Congress." He subsequently held various public offices in Delaware, and was a member of Congress from that State from 1774 to 1783, being the only member whose term continued during the whole war. In this position he ardently advocated and signed the Declaration, being one of the most resolute of the patriotic members. In 1781 he was president of Congress. In 1777 he was appointed president of Delaware, though then residing in Pennsylvania. He wrote the constitution of Delaware in a single night, and it was unanimously adopted the next day. In the same year he was elected chief-justice of Pennsylvania, which post he held till 1799, when he was elected governor of the State, and held this office till 1808. He died at Philadelphia, June 24, 1817.

McKEESPORT, a borough of Pennsylvania, in Allegheny county, 15 miles S. E. of Pittsburg. It stands at the confluence of the Monongahela and Youghiogheny Rivers, and is on 3 lines of railway. It has 4 hotels, 1 national and 1 other bank, 12 churches, 7 public school-buildings, including 2 high-schools, Roman Catholic schools, an opera-house, a Masonic hall, and a large market-house. It has extensive manufactures of tubes and pipes, 2 large rolling-mills, flour- and saw-mills, glass-works, foundries, and machine-shops, and a distillery. It is lighted with gas and electricity, and natural gas is used as a fuel in some of the works. The town has a park and water-works, It was settled in 1792 and incorporated in 1845. Its total valuation is $6,225,000; public debt, $206,000. Population in 1870, 2523; in 1880, 8212.

MACKENZIE, Alexander Slidell (1803–1848), an American naval officer and author, was born at New York, April 6, 1803. His father's name was Slidell, to which he afterwards added his mother's name of Mackenzie by act of legislature. He entered the navy in 1815, became lieutenant in 1825, and commander in 1841. In 1842 he was sent to the West African coast in command of the brig Somers, manned chiefly by naval apprentices. On the return voyage a midshipman, John H. Spencer, son of the secretary of war, with two others, was arrested on a charge of intended mutiny, tried by a council of officers, and sentenced to be hung at the yard-arm. This affair created a great sensation, with wide difference of opinion. The act was publicly approved by a high court of inquiry after his return, yet the adverse opinion continued and embittered his after life. He was ordnance officer at the siege of Vera Cruz in the Mexican war, and commanded the artillery division that stormed the town of Tabasco in 1847. He died at Tarrytown, N. Y., Sept. 13, 1848.

Mackenzie had little opportunity for education, but was an indomitable student, with strong powers of observation. He visited Europe in 1825, while off duty from ill health, and after his return published *A Year in Spain*, which work was received with great favor. While in Spain he was intimate with Washington Irving, who was then there writing the *Life of Columbus.* In 1833 he published a volume of *Popular Essays on Naval Subjects.* In 1835 he again travelled in Europe, and published *The American in England* (1835), and *Spain Revisited* (1836). In naval biography, he published *Life of Paul Jones*, *Life of Oliver Hazard Perry* (1841), and *Life of Stephen Decatur* (1846). He was an excellent descriptive writer, with a vein of good-humor which renders his books pleasant reading.

MACKENZIE, William Lyon, a Canadian political journalist, was born at Springfield, Forfarshire, Scotland, March 12, 1795. He emigrated to Canada in 1820, where he engaged in the book and drug business in Toronto. From 1824 to 1833 he edited the *Colonial Advocate* at Niagara. In this he freely criticised the acts of the government, which made every effort to suppress the paper. His press was destroyed by a mob in 1826. This riot brought him into greater prominence, and in 1828 he was sent to the provincial Parliament. He was five times expelled from and as many times re-elected to this body. In 1836 he became the first mayor of Toronto. In 1837–38 he headed the rebellion in Upper Canada, and proclaimed a new provisional government. On the failure of the insurrection he was outlawed, and escaped to the United States. Here again he was imprisoned for 12 months at Rochester, N. Y., for violation of the neutrality laws. He was afterwards for a long time connected with the *New York Tribune*, and also for a time published *Mackenzie's Gazette.* In 1845 he issued a pamphlet against W. L. Marcy, Jacob Barker, and other prominent persons, which caused great excitement in New York. He was pardoned, and returned to Canada in 1850, where he again entered Parliament. He died at Toronto, Aug. 26, 1861. His persistent agitation was not without effect, but aided greatly in the reform of the Canadian administration. He is the author of *Sketches of Canada and the United States* (1833).

MACKEREL. See Fisheries.

McLANE, Louis (1786–1857), an American statesman, was born at Smyrna, Del., May 28, 1786. He was the son of Col. Allen McLane (1746–1829), a Revolutionary officer, afterwards collector of the port of Wilmington, Del. In 1798 Louis cruised as midshipman under Com. Decatur. He afterwards went to Newark College, studied law, and was admitted to the bar in 1807. He served as one of the defenders of Baltimore in 1814. He was elected to Congress in 1817, and opposed the admission of Missouri as a slave State. In 1827 he was chosen U. S. Senator, but in 1829 Pres. Jackson sent him as minister to England. On his return in 1831 he became secretary of the treasury, but in 1833, when he refused to remove the deposits from the Bank of the United States, he was transferred to the department of state. In June, 1834, he resigned, and from 1837 to 1847 he was president of the Baltimore and Ohio Railroad. In June, 1845, Pres. Polk appointed him U. S. minister to London during the negotiations about the Oregon boundary, after the settlement of which he resigned. He was a delegate to the Maryland constitutional convention of 1850. He died at Baltimore, Oct. 7, 1857.

McLANE, Robert Milligan, an American diplomat, son of the preceding, was born in Delaware, June 23, 1815. He graduated at West Point in 1837, and served in the army in Florida, in the Cherokee country, and the North-west. Resigning in 1843, he was admitted to the bar at Baltimore, and was elected to the legislature in 1845. He was a member of Congress from 1847 to 1851. In 1853 he was sent as U. S. minister to China, and in 1859 he was U. S. minister to Mexico. Here he negotiated a treaty with Pres. Juarez purchasing Lower California, but the treaty was not ratified; yet Juarez received from the United States substantial support in his struggle with Miramon. After his return from Mexico McLane resumed the practice of his profession at Baltimore. In 1885 he was appointed by Pres. Cleveland U. S. minister to France.

McLAWS, Lafayette, an American general, was born in Georgia, January, 1821. He graduated from West Point in 1842, and entered the infantry. He served throughout the war with Mexico, was made captain in 1851, and employed on frontier duty until 1860. He resigned March 23, 1861, and entered the Confederate service, being soon made a major-general. He commanded a division in Lee's army. He had a prominent part in the battle at Antietam, and in the Chancellorsville campaign, May, 1863, he forced Gen. Sedgwick's corps across the Rappahannock. He was engaged at Gettysburg under Longstreet, and in the early part of 1865 he opposed Gen. Sherman's advance through North Carolina. He surrendered with Gen. Johnston's army in April, 1865.

McLEAN, John (1785–1861), an American jurist, was born in Morris co., N. J., March 11, 1785. In 1789 his father removed to Virginia, but in 1799 settled in Warren co., Ohio. The son received a limited education, but studied law and was admitted to the bar in 1807 at Lebanon, Ohio. In 1813 he was elected to Congress, where he introduced the law to indemnify individuals for property lost in public service. In 1816 he was made a judge of the Supreme Court of Ohio. In 1822 he was appointed commissioner of the general land office, and in July, 1823, was made postmaster-general. In 1830 he was made a justice of the U. S. Supreme Court. His anti-slavery views caused him to be mentioned as a candidate for the presidency by the Free-Soil party in 1848 and by the Republican party in 1856. In the Dred Scott case he dissented from the views of the Supreme Court as expressed by Chief-Justice Taney. He died at Cincinnati, Ohio, April 4, 1861. He published *Reports U. S. Circuit Court* (1829–42) and occasional addresses.

MacMAHON, Marie Edme Patrice Maurice de, Duc de Magenta, Marshal of France and second President of the French Republic, was born at Sully, Saône-et-Loire, July 13, 1808. He is descended from an Irish Catholic family which followed the fortunes of the Stuarts and settled in France. His father was a peer of France and a personal friend of Charles X. He was educated at the military school of St. Cyr, and assisted in the expedition to Algiers. He was made captain in December, 1833, and distinguished himself in the assault on Constantine in 1837. He rose to be colonel in 1845, general of brigade in 1848, and general of division in 1852. In August, 1855, he was assigned to the command of a division of infantry in the Crimea, and on Sept. 8 captured by a spirited assault the Malakoff, which was the key to the defences of Sebastopol. For this achievement he was, in June, 1856, made a senator. Having distinguished himself in the pursuit of the Kabyles in 1857 he was made commander-in-chief of the forces in Algeria. At the opening of the Italian war, in April, 1859, he was placed in command of the Second corps of the Army of the Alps. On June 4 he arrived at the battle of Magenta in time to render it a decisive victory, and for his services was made on the field Duke of Magenta and Marshal of France. In September, 1864, he was made governor-general of Algeria, but his personal system of government, tending to form an Arab kingdom, proved a complete failure. The European colonists left in large numbers for Brazil, while thousands of the natives perished from hunger. The archbishop of Algeria severely blamed Marshal MacMahon and an investigation increased the dissatisfaction. The marshal in 1870 twice offered his resignation, but it was not accepted until he was recalled to take part in the war with Prussia. He commanded the First army corps and was charged with the defence of Alsace. On Aug. 6, 1870, having 35,000 men, he was defeated near Wörth by Prince Frederick Charles with 75,000, and obliged to abandon the line of the Vosges. His retreat was skilfully conducted, but on the 30th his forces were again defeated and driven back. He was chief in command at the battle of Sedan, Sept. 1, but received a severe wound in the thigh at the commencement of the engagement, whereupon the command devolved on Gen. Wimpffen, who signed the capitulation. MacMahon was taken to Germany a prisoner of war. He returned to France in March, 1871, and soon after was made commander-in-chief of the army at Versailles, Thiers calling him then "le chevalier sans peur et sans reproche de notre temps." On May 28, after a struggle of some days, MacMahon wrested Paris from the Commune. Henceforth, though he repeatedly declared that he was no politician, he was marked as a candidate for the highest position in the republic. Thiers more than once offered his resignation, but it was not accepted until May 24, 1873, when Marshal MacMahon was immediately chosen to succeed him. Thiers, who had been simply a constitutionalist, had shown his desire to render the republic permanent; MacMahon, it was hoped by those who had raised him to power, would pave the way for the restoration of monarchy. The conservative Duc de Broglie was the head of the marshal's first ministry, but, as his government was too plainly reactionary, about a year later he was followed by Cissey, and other changes were made. But the rapid advance of republican sentiment in France rendered the tenure of each successive ministry less secure. In 1875 the republican constitution was definitely formed. By it the president was to be elected by the senate and chamber of deputies in joint session. His term was to be seven years. The senate was to consist of 300 members, one-fourth of whom were to hold their office for life, and the rest for nine years. As at first organized it had a monarchical majority. When the marshal, wearied with the attempt to keep pace with the changes of public opinion, recalled the Duc de Broglie as his chief adviser and then dissolved the chamber of deputies in spite of protest from the republicans, the result of the new elections only made matters worse for the marshal, the new chamber having 335 republicans against 198 of all other parties. Even some of the latter were afterwards unseated on investigation of the abuses attending the election. After considerable delay the marshal was obliged to form a cabinet of republicans. He still remained in office and did the honors of the republic to the foreign visitors during the Paris Exposition of 1878. In January, 1879, the republicans demanded the removal of some Bonapartist generals, and the marshal refusing his consent resigned Jan. 30. He retains his army rank.

McNAB, Sir Alan Napier (1798–1862), a Canadian statesman, was born at Niagara, Feb. 19, 1798. His father was a lieutenant of dragoons and an aide-de-camp to Gen. Simcoe. In the war of 1812 Alan served first as midshipman under Sir James Yeo in expeditions against Sackett's Harbor and other American ports on Lake Ontario, and afterwards as an ensign in the army. After the war he studied law and entered on practice at Hamilton. He was also a clerk in the assembly of Upper Canada, was elected a member in 1829, and afterwards was speaker. In the insurrection of 1837 he was colonel of the militia on the Niagara frontier and routed the insurgents near Toronto, Dec. 7, 1837. When their leader, W. L. Mackenzie, took possession of Navy Island in Niagara River, and received reinforcements and supplies by the steamer Caroline from the American side, McNab sent over a party of men who seized and burnt the steamer and sent her adrift over the falls. For his services he was knighted July 14, 1838. He was speaker of the united provinces of Canada in 1844, prime minister under the Earl of Elgin, 1846–54, and again under Sir Edmund Head, 1854–56. He was made a baronet in 1858 and a member of the legislative council in 1860. He died at Toronto, Aug. 8, 1862.

MACOMB, ALEXANDER (1782–1841), an American general, was born at Detroit, Mich., April 13, 1782. He entered the army in 1799 as a cornet of cavalry, and in 1812 was lieutenant-colonel of engineers and adjutant-general of the army. Desiring to engage in active service he was made colonel of an artillery regiment, and for his services at Niagara and Fort George he was made brigadier-general in January, 1814. At Plattsburg, N. Y., on Sept. 11, 1814, he was attacked by Sir George Prevost with a force three times as large as his own. But the British troops were repulsed, and their accompanying fleet on Lake Champlain being defeated by MacDonough the expedition withdrew to Canada. Macomb received the thanks of Congress, a gold medal, and the brevet of major-general. He commanded the N. W. military department until 1821, when on the reorganization of the army he was made colonel of engineers. In 1835 he became commander-in-chief of the U. S. army. He died at Washington, June 25, 1841.

His son, WILLIAM HENRY MACOMB (1818–1872), was born June 16, 1818, in Michigan; entered the navy as midshipman in 1834, and while lieutenant took part in the capture of the barrier forts at Canton, China, in 1856. He commanded the Metacomet in the Paraguay expedition of 1859, and became a commander in 1862, served on the Mississippi River in 1863, and in the sounds of North Carolina in 1864, where he captured Plymouth, Oct. 31. He became captain in 1866, and commodore in 1870. He died at Philadelphia, Aug. 12, 1872.

MACON, a city of Georgia, county-seat of Bibb county, is on both banks of the Ocmulgee River at the head of navigation, 192 miles W. N. W. of Savannah. It is surrounded by forest-clad hills. Six lines of railway either pass through or terminate in the city. The city has a court-house, academy of music, a female college, Mercer University (Baptist), a Roman Catholic college, 5 hotels, 1 national and 6 other banks, 1 daily and 2 weekly newspapers, 15 churches, flour- and lumber-mills, cotton-factories, foundries, and other manufactories, a fine public park, and public schools for both colored and white pupils. It has also a public water-supply, is gas-lighted, and is the seat of a large distributing trade. A great amount of cotton is shipped from this point. Macon was incorporated as a city in 1826. The population in 1870, 10,810; in 1880, 12,749.

MACON, NATHANIEL (1758–1837), an American statesman, was born in Warren co., N. C., in 1758. While he was attending Princeton College, N. J., the Revolutionary war broke out, and he entered the army as a private, and towards the end of the war served in South Carolina. He was a member of the State senate, 1780–85, and of Congress 1791–1815, being speaker 1801–06. He was elected U. S. Senator in 1816, and in 1825 was chosen its president *pro tem.* In 1828, having accomplished his seventieth year, though still in the full possession of all his faculties of mind and body, he voluntarily retired from the Senate to private life. In 1835 he was president of the State Constitutional Convention. He was a sincere advocate of extreme Democratic simplicity in both public and private affairs, and exemplified his principles in his own life. He died in Warren co., N. C., June 29, 1837. E. R. Cotton published a sketch of his life (Baltimore, 1840). See T. H. Benton's *Thirty Years' View.*

McPHERSON, JAMES BIRDSEYE (1828–1864), an American general, was born in Sandusky co., Ohio, Nov. 14, 1828. He graduated at West Point in 1853, and for a year later was employed as instructor there. He was afterwards engaged on the defences of New York harbor, and San Francisco harbor. On the outbreak of the civil war he organized a corps of engineers at Boston. In November, 1861, he became aide-de-camp to Gen. H. W. Halleck. He was engaged as staff-officer and engineer with Gen. Grant from Fort Henry, Feb. 6, 1862, to the siege of Corinth, Oct. 4, when he was made major-general of volunteers. In the march through Central Mississippi he commanded the right wing of the army, and he was conspicuous in the siege of Vicksburg, keeping off Gen. J. E. Johnston's army, and making gallant assaults on the beleaguered city. He was made brigadier-general in the regular army Aug. 1, 1863. He was assigned to the command of the Army of the Tennessee in March, 1864, and reorganized it for the advance into Georgia. In the hard fighting which followed he was highly distinguished. He was killed before Atlanta, July 22, 1864.

McTYEIRE, HOLLAND NIMMONS, an American bishop, was born in Barnwell district, S. C., July 28, 1824. He graduated at Randolph Macon College, Va., in 1844, joined the Virginia Conference of M. E. Church South, and was stationed at Williamsburg. In 1846 he removed to Mobile, and in 1849 to New Orleans, where he became editor of the *New Orleans Christian Advocate.* He was appointed editor of the Nashville *Christian Advocate* in 1858, and was elected a bishop in 1866. He has been president of the trustees of Vanderbilt University since 1873.

McVICKAR, JOHN (1787–1868), an American clergyman, was born at New York, Aug. 10, 1787. He graduated at Columbia College in 1804, and spent some time at Cambridge, England. He was ordained in the Protestant Episcopal Church in 1811, and was rector of a church at Hyde Park until 1817, when he was appointed professor of moral philosophy, rhetoric and *belles-lettres* in Columbia College. He held this position till 1864, when he was made professor emeritus. Besides much church work in New York city, he was from 1844 to 1862 chaplain at Fort Columbus, Governor's Island. He is credited with the system of free-banking adopted in New York, and afterwards partly incorporated in the national banking system. He died at New York, Oct. 29, 1868. Among his publications are *Life of Samuel Bard* (1822); *Outlines of Political Economy* (1825); biographies of *Rev. E. D. Griffin* (1831) and *Bishop Hobart* (1834–6). His *Life* has been written by his son, W. N. McVickar (1873).

MADISON, a city of Indiana, county-seat of Jefferson county, is on the Ohio River, opposite Milton, Ky., and 45 miles N. N. E. of Louisville. It is a terminus of one division of the Jeffersonville, Madison, and Indianapolis Railway. Its site is partially enclosed by steep hills. The town is substantially built, is gas-lighted, and has a fine court-house, numerous churches and schools, including a high-school, a good public library, several national banks, daily and weekly newspapers, and carries on trade by rail and river. It has steamboat-yards, boiler- and machine-works, and manufactures of flour, leather, furniture, and other commodities. The shipments of grain and provisions are large. Pork-packing is a leading interest. Population in 1880, 8945.

MADISON, a city, the capital of Wisconsin, and county-seat of Dane county, is finely situated on a strip of ground between Lakes Monona and Mendota, two of the celebrated "four lakes" of Wisconsin, in 43° 5′ N. lat., 80° 20′ W. long. The railway lines which centre here belong to the Chicago and Northwestern and Chicago, Milwaukee, and St. Paul systems. The surroundings are naturally very attractive. Among the principal buildings are the State capitol, the State University (a well-conducted institution, open to students of either sex), the U. S. building, the asylum for the insane, and the county buildings. The city has 8 hotels, a national and 2 other banks, 6 weekly and 2 daily newspapers, 13 churches, good public and private schools and seminaries, and carries on manufactures of tools, machinery, engines, flour, farm-implements, printing-presses, stones, and other goods. It is gas-lighted, and has water-works and 3 public parks. Total valuation, $13,000,000; public debt, $328,500. When in 1836 it was chosen as the State capital there was only one house on the ground. It was incorporated as a city in 1856. Madison is a noted summer and health resort. Population in 1880, 10,324.

MADISON, JAMES (1749–1812), an American bishop, second cousin of President James Madison (for whom see ENCYCLOPÆDIA BRITANNICA), was born in Rockingham co., Va., Aug. 27, 1749. He graduated at William and Mary College in 1772, and studied theology, meanwhile teaching mathematics in that college. In 1775 he went to England and was ordained by the bishop of London. In 1777 he was made president of William and Mary College, and after 1784 he held the chair of natural, moral, and political philosophy. He was chosen first bishop of Virginia, and was consecrated by the Archbishop of Canterbury, at Lambeth palace, Sept. 19, 1790. He continued to act as president of the college until his death, March 6, 1812. He published some addresses and sermons, and contributed scientific papers to Barton's *Journal* and the *Transactions of the American Society*.

MADISON UNIVERSITY, an institution of learning at Hamilton, N. Y., was chartered as a university in 1846; but the "Hamilton Literary and Theological Institution," of which it is an outgrowth, was opened in 1820. A distinct college course was organized in 1834, and the first class was graduated from that course in 1835. A theological school, known as "Hamilton Theological Seminary," also received a distinct form in 1834. A preparatory school was established in 1832. This was known, after 1846, as the "Grammar School of Madison University." Since 1873 it has had the name of "Colgate Academy." The designation of Madison University is sometimes used to cover all three of these institutions.

The first president of Madison University was Rev. Nathaniel Kendrick, D. D. (1820–48); and his successors have been Stephen W. Taylor, LL.D. (1851–56), Rev. George W. Eaton, D. D., LL.D. (1856–68), and Rev. E. Dodge, D. D., LL.D., the present head of the institution, who was inaugurated in 1868. There are ten professorships, embracing the usual departments in letters, science, and philosophy. The faculty consists of the following instructors: Ebenezer Dodge, D. D., LL.D., president and professor of metaphysics; Philetus B. Spear, D. D., emeritus professor of Latin and Hebrew; Alexander M. Beebee, D. D., professor of logic; Lucien M. Osborn, LL.D., professor of applied mathematics and astronomy; N. Lloyd Andrews, Ph.D., LL.D., professor of the Greek language and literature and dean of the faculty; James M. Taylor, A. M., professor of mathematics; Walter R. Brooks, D. D., lecturer on natural history; William H. Maynard, D. D., professor of moral philosophy and political economy; Albert G. Harkness, A. M., professor of Latin and the modern languages; Joseph F. McGregory, A. M., professor of chemistry and mineralogy; Benjamin S. Terry, A. M., professor of civil history, English, and oratory; S. Burnham, D. D., librarian.

The endowment, begun in 1850, has been largely increased since 1865, and the present aggregate of invested funds is $530,000. There is a library fund of $25,000, and various scholarships and prize funds exist. The university buildings consist of Alumni Hall, containing the library, chapel, and other public rooms; East College and West College, containing students' rooms, and the Chemical Laboratory. This last is a beautiful new building, valued at $25,000. A fire-proof library building is about to be erected by the president of the board of trustees, Mr. James B. Colgate, of New York, at an estimated cost of $100,000. The library contains 18,000 volumes. The museum of natural history contains an excellent working collection.

Besides the usual classical course, which aims to unite the old and the new subjects of education in a well-balanced curriculum, the university offers also a four years' scientific course. The friends of the institution consider its honorable history, the wide distribution of its alumni, its high standards of scholarship, and its scope and methods of instruction, as furnishing a guarantee of future prosperity and progress. A jubilee volume was published in 1872, entitled the *First Half Century of Madison University.* Besides much other historical matter, this volume contains biographical notices of hundreds of the alumni.

HAMILTON THEOLOGICAL SEMINARY is the oldest Baptist theological school in the United States. It is under the control of the Baptist Education Society of the State of New York, organized in 1817 for the promotion of ministerial education. The seminary was opened in 1820, and has sent into the Christian ministry 600 graduates, besides several hundred who have pursued one or two years of the course of study. Among its first graduates were Rev. Jonathan Wade, D. D., and Rev. Eugenio Kincaid, D. D., two of the earliest American missionaries to the Karens of Burmah. In all, 80 graduates of the Hamilton Seminary have been foreign missionaries, and have been among the most successful laborers in that department of Christian endeavor. Throughout the United States the alumni of this seminary have been widely scattered, and have made a most honorable record in the ministry of the gospel. They have been distinguished by an earnest evangelical spirit, by practical methods of work, by their interest in missions, and by the happy combination of pulpit and pastoral gifts. A large number of them have been actively identified with educational work, theological or general, as presidents or professors of institutions of learning. The Hamilton Theological Seminary has thus been one of the most potent factors in the growth of American Baptists since 1820.

Among those who have filled its chairs of instruction have been Daniel Hascall, Nathaniel Kendrick, Barnas Sears, Thomas J. Conant, John S. Maginnis, Asahel C. Kendrick, George W. Eaton, and Albert N. Arnold.

The present instructors are: Rev. Ebenezer Dodge, D. D., LL.D., professor of Christian theology; Rev. Alexander M. Beebee, D. D., professor of homiletics; Rev. H. Harvey, D. D., professor of New Testament exegesis and pastoral theology; Rev. William H. Maynard, D. D., professor of ecclesiastical history; Rev. S. Burnham, D. D., professor of Hebrew and Old Testament exegesis.

The prescribed course of study is three years, and provision is made for special students. The work of the regular departments is supplemented by courses of lectures from eminent scholars and divines, specially invited for this purpose. The libraries accessible to the students number 20,000 volumes. Students of the seminary may receive aid from the Education Society, in scholarships permanently established by individuals or through contributions annually made by the churches.

The seminary building, erected in 1885, is one of the finest structures for such a purpose in the United States. It stands on a beautiful hill overlooking Hamilton and the Chenango Valley. The building is constructed of native blue or Hamilton stone, coursed and trimmed with Syracuse limestone, Trenton pressed brick, and terra-cotta. Its dimensions are 135 by 60 feet. It is four stories in height, containing, besides students' rooms, a chapel, lecture-rooms, reading-room, etc. All the appointments of this new edifice are thoroughly first class, and its erection is auspicious of this seminary's continued prosperity.

Colgate Academy was established in 1832, and for forty years was exclusively a school preparatory for college. In 1873 its scope was enlarged, and, besides its thorough classical course, business and scientific courses were provided for general academic students. Its former name of "Grammar School of Madison University" was changed to Colgate Academy. This change accompanied the erection of its beautiful and commodious building, at the expense of Mr. James B. Colgate, of New York, in memory of whose parents it is named. The cost of building and grounds was $60,000. All of its arrangements are of the best modern style.

The corporation of Madison University are the trustees of the academy. A special endowment of $55,000 has been provided by Mr. James B. Colgate and Mr. John B. Trevor, of New York. The financial stability thus guaranteed enables the academy to maintain high standards of instruction and discipline. It is at present an academy for boys only. The number of its pupils, according to the catalogue of 1885–86, is 148. It has six instructors. The principal is Prof. James W. Ford, Ph. D. There are several prizes established, and some provision is made for aid to students of high character and promise whose means are limited. Since 1873 Colgate Academy has achieved a reputation as one of the foremost academies in the State of New York. (N. L. A.)

MÄDLER, Johann Heinrich (1794–1874), a German astronomer, was born at Berlin, May 26, 1794. He became a teacher in the normal school there, and in 1829 began to construct the map of the moon, which was published in 1834–36. After its publication he was made director of the Berlin observatory, and in 1840 was called by the Russian government, for which he had already done important work, to take charge of the observatory at Dorpat. In 1865 on account of a disease of the eyes he returned to Germany. He died at Hanover, March 14, 1874. He made important observations on Mars and Jupiter, on double and variable stars, and on the centre of gravity of the solar system. In his work *Die Centralsonne* (1846) he presented the hypothesis of a central sun, around which the whole stellar universe revolves, and suggested Alcyone as that sun. He also published *Allgemeine Selenographie* (1837); *Populäre Astronomie* (1841); *Geschichte der Himmelskunde* (1873); and other works.

MADVIG, Johann Nicholai, a Danish philologist, of Jewish descent, was born at Svaneke, Bornholm, Aug. 7, 1804. He was educated at the University of Copenhagen, and in 1829 appointed professor of the Latin language and literature there. He established a high reputation by his editions of Livy, Juvenal, Cicero, and Lucretius, by his *Latin Grammar* (1841), and his contributions to classical philology and archæology. In 1848 he was appointed minister of public worship, and in 1852 director of public instruction. In 1854 he was elected to the diet, and there was a prominent advocate of the union of the Scandinavian nations. He was afterwards professor of classical philology in the University of Copenhagen. As a scholar Madvig belonged to the classical exclusivists, and profited little by the new light derived from comparative philology. But in his own department he was keen, accurate, and brilliant. Besides the works already referred to he published *Adversaria Critica ad Scriptores Græcos et Latinos* (3 vols., 1871–84); and *Die Verfassung und Verwaltung des römischen Staats* (2 vols., 1881–82).

MAFFITT, John Newland (1794–1850), an American preacher, was born at Dublin, Ireland, Dec. 28, 1794. He became a Wesleyan preacher, and soon displayed remarkable oratorical gifts. In 1819 he removed to the United States, and entered the New England M. E. Conference. He was pastor of prominent churches and attracted large audiences. In 1831 he removed to New York, and was thereafter an itinerant evangelist, having great success as a revivalist in the Southern and Western States. In 1837 he was made professor of elocution and *belles-lettres* in La Grange College, Ala. In 1841 he was chosen chaplain of Congress. He afterwards edited a monthly called the *Calvary Token*, at Auburn, N. Y., but in 1847 returned to the South. He died at Mobile, Ala., May 28, 1850. He published *Tears of Contrition* (1821); *Pulpit Sketches* (1828); *Poems* (1839); and left an *Autobiography*. His son, Stephen N. Maffitt, commanded the Confederate cruiser Florida (see Vol. I., p. 155).

MAGNUSEN, Finn (1781–1847), a Danish archæologist, was born at Skalholt, Iceland, Aug. 27, 1781. He was educated at the University of Copenhagen, and became a lawyer in Iceland in 1803, but in 1812 settled at Copenhagen. He was appointed professor of northern antiquities in 1815 and keeper of the archives in 1842. He died at Copenhagen, Dec. 24, 1847. He translated the older *Edda* and published it with abundant commentaries (4 vols., 1821–23). He also prepared a dictionary of Scandinavian mythology (1828) and a full exposition of its system (1826). All his writings indicate excellent judgment as well as extensive learning.

MAHAFFY, John Pentland, an Irish educator, was born at Chafonnaire, Switzerland, Feb. 26, 1839. He was educated in Germany and at Trinity College, Dublin, graduating in 1859, and winning a fellowship in 1864. He was a tutor and lecturer, and was made a professor of ancient history there in 1869. He was Donnellan lecturer in theology for 1873–74. He is noted for a wide range of scholarship, aptness in teaching, progressive ideas on education, and his fondness for field sports. He has been a frequent contributor to periodicals and has published books of acknowledged merit on many subjects. Among these are *Lectures on Primitive Civilization* (1868); *Prolegomena to Ancient History*, treating of Egyptian antiquities (1870); *Greek Social Life from Homer to Menander* (1874); *Rambles and Studies in Greece* (1876); *History of Greek Classical Literature* (1880). His works are clear, and even brilliant presentations of the subjects treated, but are sometimes careless and inaccurate. Mr. Mahaffy is a disciple of Kant, and besides translating Kuno Fischer's *Commentary on Kant* (1866) has published *Kant's Critical Philosophy for English Readers* (2 vols., 1871–72).

MAHAN, Asa an American clergyman and author, was born at Vernon, N. Y., in 1799. He graduated at Hamilton College in 1824 and at Andover Theological Seminary in 1827. He was ordained pastor of a Presbyterian church at Pittsford, N. Y., in 1829, but in 1831 took charge of a church in Cincinnati. In 1835 he was made president of Oberlin College and professor of intellectual and moral philosophy. In 1850 he became president of Cleveland University, and in 1856 resumed the pastorate at Jackson, Mich. In 1858 he became pastor of the Congregational church at Adrian, Mich., and in 1861 was made president of Adrian College. He retired in 1871. His works relate to religious life and to moral and mental philosophy. In the former class are *The True Believer* (1847) and *The Scripture Doctrine of Christian Perfection*, which doctrine he earnestly maintained. In the latter class are *Science of Intellectual Philosophy* (1845); *Doctrine of the Will* (1846); *Science of Moral Philosophy* (1856); and also *Science of Logic* (1857).

MAHAN, Dennis Hart (1802–1871), an American military engineer, was born at New York, April 2, 1802, but was taken to Norfolk, Va., in infancy. He graduated at West Point in 1824, and was made assistant professor of mathematics there, and in 1825 assistant professor of engineering. He spent 1826–30 in the study of fortifications in Europe, and in 1832 was made professor of military engineering at West Point. He was of nervous temperament and subject to fits of depression. Having learned that he was to be put on the retired list he committed suicide by drowning near Stony Point, N. Y., Sept. 16, 1871. He published several valuable works on civil and military engineering and geometry. The most important is *Military Engineering* (2 vols., 1865–67).

MAHAN, MILO (1819–1870), an American clergyman, brother of the preceding, was born at Suffolk, Va., May 24, 1819. He was educated at St. Paul's College, Flushing, L. I., and was ordained in the Protestant Episcopal Church in 1845. After serving churches in Jersey City and Philadelphia he was made professor of ecclesiastical history in the General Theological Seminary, New York, in 1851. He became rector of St. Paul's Church, Baltimore, in 1864, and died there, Sept. 3, 1870. He published *The Exercise of Faith* (1851); *History of the Church, First Three Centuries* (1860). After his death an enlarged edition of this *History* appeared (1872), and his entire *Works* were edited with a memoir by J. H. Hopkins, D. D. (3 vols., 1872–75).

MAHANOY CITY, a borough of Pennsylvania, in Schuylkill county, is 13 miles N. N. E. of Pottsville, and 109 miles N. W. of Philadelphia. It is on branches of the Reading and the Lehigh Valley Railroads. It is a seat of very active operations in the mining of anthracite coal, and has a national bank, churches of all the leading denominations, 3 newspapers (one of them a tri-weekly), and several manufactories. The town has 2 public halls and 1 library. The population in 1870, 5533; in 1880, 7181.

See Vol. XV. p. 299 Am. ed. (p. 297 Edin. ed.).

MAINE, the extreme north-eastern State of the United States of America, was admitted into the Union as a State on March 20, 1820, the population then being 298,269. According to the U. S. census of 1880 the white population numbered 646,852, and the colored 2084, including 625 Indians. The population to the square mile was 21.7; the number of dwellings, 124,959; persons to a dwelling, 5.19; number of families, 141,843; persons to a family, 4.58. The voting population was 186,659, of whom 22,486 were foreign-born and only 664 colored.

Education. — Since 1837 the State has had a board of education for the general care of public schools. This board has a secretary and 3 agents for the local inspection of schools. Each town has an elective school committee for the direction and care of its schools, and may also have a superintendent. Cities have like arrangements. The following statistical summary shows the general condition of the public schools of the State in 1882–84:

	1882–83.	1883–84.
Youth of school age (4–21)	213,294	212,390
Enrolled in public schools	146,513	145,438
Average daily attendance	97,900	98,455
School districts	3,969	3,865
Public school-houses	4,292	4,312
Average of days open	116	114
Whole number of teachers	9,624	9,658
Whole expenditure	$1,118,161	$1,157,534
Value of school property	2,970,956	3,045,822
Average monthly pay of male teachers	31.87	32.59
Average pay of female teachers	15.36	16.28

From 1870 to 1884, with the exception of two years, the number of children of school age in the State constantly decreased. There are normal schools at Castine, Farmington, and Gorham, and a training school for the Madawaska territory. Normal training is also given in the Maine Central Institute at Pittsfield, and the Normal Training and Practice Class at Portland. These schools have been growing in public favor; for ten years they have existed in their present form.

There were also free high schools in 123 towns, with 9757 pupils and an average attendance of 7733.

Agriculture and Stock-Raising.—The following table shows the principal crops for 1884:

Products.	Bushels produced.	Average bushels per acre.	Number of acres.	Average price per bushel.	Total value.
Indian corn	1,062,000	34.7	30,610	$0.75	$796,500
Wheat	629,000	15.0	41,965	1.25	786,250
Rye	32,000	13.1	2,409	.90	28,800
Oats	2,428,000	29.0	83,733	.43	1,044,040
Barley	265,000	21.7	12,180	.73	193,450
Buckwheat	360,000	17 0	21,185	.55	198,000
Potatoes	5,842,000	97.0	60,228	.46	2,687,320
Hay, tons	1,029,760	.95	1,083,958	12.25	12,614,560
Total	....	....	1,336,268	....	$18,348,920

The U. S. department of agriculture, on Jan. 1, 1886, gave the following estimated statistics of animals on farms in Maine:

Animals.	Number.	Average price.	Total Value.
Horses	90,288	$88.30	$7,972,453
Milch-cows	165,353	30.10	4,977,125
Other cattle	187,030	29.89	5,590,174
Sheep	537,407	2.15	1,156,771
Hogs	70,702	8.78	620,760

In some sections, such as Aroostook, Oxford, and Penobscot counties, there has been, since the U. S. census of 1880, a systematic improvement in the various breeds of cattle, both by the importation of thoroughbred animals from other States and from careful selection and cross-breeding, which has made a noticeable improvement in the character of the stock kept, and consequently in its value.

In other sections but little attention has been given to live-stock improvement. There much of the stock partakes of the character of the old native breeds, and to that extent its value has run down in the scale.

Finances.—The funded State debt on Jan. 1, 1885, was $5,316,900, nearly all of which had been incurred in support of the war for the Union. The amount in the sinking fund was $1,826,200. The receipts for the year 1884 were $1,307,648, and the expenditures $1,202,933, the amount raised by taxation being $1,301,270.53. The total assessment of taxable property was $208,709,381, divided as follows: real, $148,489,142; personal, $60,220,239. The rate of tax was 40 cents on $100.

Manufacturing.—On Jan. 1, 1885, there was one blast-furnace in the State, the pig iron produced being manufactured with charcoal as fuel. The production of pig iron in Maine for each of the years from 1873 to 1883 has been as follows:

Year.	Short Tons.	Year.	Short Tons.
1873	780	1879	1,240
1874	1,661	1880	3,578
1875	2,046	1881	4,400
1876	3,002	1882	4,100
1877	1,960	1883	4,400
1878	1,190		

The following summary shows, according to the U. S. census of 1880, the general condition of the mechanical and manufacturing industries in the State:

Manufacturing industries.	Number of establishments.	Capital.	Total amount paid in wages during the year.	Materials.	Value of products.
Agricultural implements	28	$726,300	$174,075	$329,675	$661,445
Boots and shoes	52	1,369,000	1,335,168	3,880,446	5,823,541
Brick and tile	96	280,549	106,538	122,887	310,958
Brooms and brushes	11	66,100	38,500	208,025	292,950
Carriages and wagons	46	274,100	142,044	201,857	460,609
Clothing, men's	79	443,475	262,112	637,546	1,130,381
Cooperage	118	189,913	105,614	193,234	385,304
Cotton goods	24	15,292,078	2,936,640	7,320,152	13,319,363
Dyeing textiles	4	593,500	166,619	321,989	1,107,616
Fertilizers	13	184,625	30,410	198,600	283,650
Flouring products	261	993,500	109,882	3,560,926	3,966,023
Foundry and machine-shop products	76	1,793,720	681,865	1,131,447	2,232,675
Fruits and vegetables, canned and preserved	18	926,535	216,400	823,005	1,402,100
Furniture	68	310,950	142,500	282,590	572,275
Iron and steel	3	450,000	141,494	380,511	583,328
Leather, board	5	120,000	53,500	164,000	296,000
Leather, curried	34	510,900	99,094	2,290,310	2,612,350
Leather, tanned	83	2,459,700	464,904	5,535,427	7,100,967
Lime and cement	28	942,150	86,274	393,309	599,695
Lumber, planed	33	300,000	89,865	351,471	511,799
Lumber, sawed	848	6,339,396	1,161,142	4,951,957	7,933,868
Matches	3	71,000	38,212	263,693	314,593
Mixed textiles	15	1,290,380	357,595	1,238,247	1,909,937
Oil-cloth, floor	4	695,000	124,500	535,075	713,000
Paper	12	1,995,000	325,691	1,347,509	2,170,321
Printing and publishing	48	747,600	297,005	976,317	1,606,098
Saddlery and harness	127	166,165	72,865	225,048	393,326
Ship-building	379	811,750	838,559	1,935,857	2,909,846
Slaughtering and meat-packing	6	194,500	34,300	1,008,605	1,093,687
Starch	23	294,200	23,280	339,611	442,700
Sugar and molasses	2	460,000	34,457	1,416,414	1,499,512
Tin, copper, and sheet-iron ware	99	259,300	90,304	192,455	400,195
Wood pulp	7	439,000	80,075	160,595	306,490
Woollen goods	93	3,876,028	1,044,606	4,294,042	6,686,073
All industries	4,481	$49,988,171	$13,623,318	$51,120,708	$79,829,793

Minerals.—The quantity of feldspar mined in Maine in 1883 was 3200 tons, but in 1884 only 900 tons. A small quantity of gypsum, estimated at about 10,000 tons of domestic quarried stone, is annually burned and ground in Maine. Mines were formerly worked for bog manganese in several localities in Knox, Oxford, and Hancock counties. Unsuccessful attempts at mica mining have been made in Maine, at Gilead and Albany, but promising deposits of mica are said to exist in the adjacent towns of Woodstock and Rumford. In Paris, at Mount Mica, a good deal of excellent mica has been taken out and sold. Tin ore has been observed at several localities in the granitic rocks of Maine, and about the year 1880 a company was organized for mining tin at Winslow. In 1879 some attention was given to copper mining in Maine, but the results were disappointing; and though several ores of copper are known to occur the mines have produced but a small amount.

The granite of Maine is well known and hundreds of quarries are worked along the coast. Red granite is found on the coast of Washington county, and in the same region there are ledges of diabase, called black granite. The lime of Thomaston, Rockland, and Camden is of excellent quality. The chief slate-quarries are at Monson and in its vicinity; but the reefs of slate are of large area, and the business is capable of indefinite extension. At Orr's Island there is a bed of steatite 14 feet wide. The principal iron-works using native ore are the Katahdin works, situated 50 miles S. W. of Mt. Katahdin. At many points, chiefly along the coast, ores of silver-bearing galena are found. Many companies have been organized in recent years for working these ores; but, as a rule, they are too refractory to be wrought with profit.

Maine abounds in rare and interesting minerals: among them the lepidolite of Hebron may be noticed, which is important as being one of the minerals richest in the rare metal cæsium.

There are many mineral springs which are utilized both as health resorts and by sale of their waters. They are all cold, and are classified as chalybeate, sulphuretted, alkaline, and saline.

The annual ice-crop of the Kennebec River is usually very valuable; a large number of companies are located there, and are engaged in harvesting and storing the ice, which during the summer months is distributed and consumed principally in the cities of the Atlantic States.

Railroads.—On Jan. 1, 1885, there were 1213 miles of railroads; during the previous year 1066 miles had been operated; capital stock, $18,967,514; funded debt, $22,342,930; total investment, $42,199,067; cost of railroad and equipment, $40,138,574; interest paid on bonds in 1884, $1,000,757; dividend paid on stocks, $803,889.

Liquor Legislation.—Maine still retains its prohibitory liquor law enacted in 1851. In 1877 it was declared that wine and cider, when used for tippling, are to be considered intoxicants, and the manufacture of any intoxicating liquor, except cider, was prohibited under heavy penalties. The effect of this law was to close the few breweries which had remained in Portland after all others in the State had been closed. In 1878 there was considerable disaffection towards the Republican party. The State constitution required the governor to be elected by a majority of all the votes cast at the popular election; but if no person had such majority the legislature was empowered to choose the governor from the two candidates having the highest number of votes. In this election the Democrats and Greenbackers had secured a majority of the legislature, and when it met it chose Garcelon, the Democratic candidate. In the same session attempts were made to modify the liquor laws by giving more freedom to druggists in the sale of liquors, and allowing the sale of malt liquors, but all the measures proposed failed. In 1884 the question of constitutional prohibition was again submitted to the people, and decided in the affirmative by a large majority. (C. T. D.)

MAINE, Sir Henry Sumner, an English jurist, was born in 1822. He graduated at Pembroke College, Cambridge, in 1844, and was elected a fellow of the college. He was professor of civil law at Cambridge from 1847 to 1854, and thereafter reader on jurisprudence at the Middle Temple, London, until 1862. He was then called to India to take part in legislative reform, and was active in this work until 1869. He was appointed corpus professor of jurisprudence at Oxford University in 1870, and was member of council for India from 1871 to 1877. He has since been master of Trinity Hall, Cambridge. His works have had profound effect, having proved the inaccuracy of the theories which had long prevailed in regard to the institutions of civilized society. The most important are *Ancient Law; its Connection with the Early History of Society* (1861), which has passed through many editions; *Village Communities in the East and West* (1871), in which he combines and compares the institutions of modern India with those of Europe in their primitive forms; and *Early History of Institutions* (1875).

MAIZE. See under Agriculture, American, Vol. I., p. 106.

MAKART, Hans (1840–1884), an Austrian painter, was born at Salzburg, May 28, 1840. He studied at Vienna and at Munich, where he became the best pupil of Piloty. He afterwards became professor in the Academy at Vienna. He visited Italy in 1869 and Egypt in 1876. In that year his large picture of Venice doing Homage to Catharine Cornaro was exhibited at the Centennial Exhibition in Philadelphia. It is now in the Berlin National Gallery. Among his other works are Roman Ruins, The Plague at Florence, Cleopatra, Entrance of Charles V. into Antwerp. He also painted many scenes from Shakespeare. His large canvases are brilliant in coloring but often too crowded, and many of his themes are sensuous. He died at Vienna, Oct. 3, 1884.

MAKEMIE, Francis (1658–1708), the founder of the Presbyterian Church in the United States, was born near Rathmelton, County Donegal, Ireland. He was licensed by the Presbytery of Laggan in 1681, and went to the Barbadoes. Afterwards he removed to Maryland, where, in 1684, he organized a church at Snow Hill. He married a lady of Virginia and itinerated through the Southern States. In 1704 he visited England and brought over two more ministers. He assisted in forming the Presbytery of Philadelphia and was its moderator in 1706. In the following year he was arrested and imprisoned for preaching at Newtown, L. I., and though subsequently acquitted was compelled to pay the costs. He died in Accomac co., Va., in 1708.

MALACHI. See Prophets.

MALAN, César Henri Abraham (1787–1864), a Swiss clergyman, was born at Geneva, July 7, 1787. He studied theology there, but was a rationalist until 1817 when, under the influence of Robert Haldane and Rev. Dr. J. M. Mason (*q. v.*), he became an Evangelical Trinitarian. But on broaching his Calvinistic views he was forbidden by the pastors' association to discuss such doctrines. When he persisted he was excluded from the pulpits. He then held meetings in his own house and afterwards in a chapel, and made missionary tours in Protestant countries, producing remarkable revivals. He was a man of deeply spiritual nature and highly accomplished. He died at Geneva, May 18, 1864. His *Life* was written by his son (1864). His hymns *Les Chants de Sion* (1826), with music (1841), were very popular. Many of his books and tracts have been translated into English.

MALAN, Solomon César, an English clergyman, son of the preceding, was born at Geneva in 1812. He was educated at St. Edmund's Hall, Oxford, where he graduated B. A. in 1837. He went in 1838 to Calcutta as classical professor in Bishop's College, and took orders in the Church of England. Returning to England he took his degree as M. A. in 1843, and in 1845 became vicar of Broadwindsor, Dorsetshire. He was made prebendary of Sarum in 1871. He has written many works on ecclesiastical subjects, ornithology, travels, etc. He has also composed sacred music, designed illustrations for various publications, and translated many books, chiefly religious, from Russian, Chinese, Ethiopic, and other languages. He understands more than 100 languages, and is the greatest polyglot scholar since Mezzofanti. One of his works is a translation of St. John's Gospel from the eleven oldest versions except the Latin.

MALARIA. See Fever.

MALCOM, Howard (1799–1879), a Baptist clergyman, was born at Philadelphia, Jan. 19, 1799. He graduated at Dickinson College in 1817, studied at Princeton Theological Seminary, and was ordained to the Baptist ministry. He had charge of churches at Hudson, N. Y., Boston, and Philadelphia, but on account of failure of his voice was obliged to retire from preaching. He was made president of Georgetown College, Ky., in 1839, and held this post ten years. In 1851 he became president of Lewisburg University, Pa., but in 1859 retired and took up his residence in Philadelphia. He took part in founding and furthering the American Sunday School Union and the American Tract Society. He died at Philadelphia, March 25, 1879. Among his publications are a *Dictionary of the Bible* (1828); *Christian Rule of Marriage* (1830); *Travels in South-eastern Asia* (1839), describing his visit to the Baptist Missions there in 1835–36; *Index to Religious Literature* (1870).

MALDEN, a city of Massachusetts, in Middlesex county, 5 miles N. of Boston, with which it is connected by the Boston and Maine Railroad and by a street railway. Branch railroads extend to Lynn and Medford. Malden has several commodious churches, 2 weekly newspapers, a high-school, national and savings banks, and is the seat of manufactories of India-rubber goods, cords, tassels, leather, sand-paper, and other wares. Malden was incorporated in 1649 and was chartered as a city in 1882. Population of the township in 1870, 7367; in 1880, 12,017.

MALLOCK, William Hurrell, an English author, was born in Devonshire in 1849. He is a nephew of J. A. Froude. He was educated at Oxford and in 1871 obtained the Newdegate prize for an English poem. He published *Every Man his own Poet* (1872), but his reputation as satirist was established by his *New Republic* (1876), a dialogue in imitation of Plato's *Republic*. Prominent representatives of English thought and society were here presented in a very realistic way. This was followed by *The New Paul and Virginia, or Positivism on an Island* (1878). Further sensation was excited by his essay *Is Life worth Living?* (1879), a forcible statement of pessimism.

MALLORY, Stephen R. (1810–1873), an American statesman, was born at Nassau, N. P., in 1810, being son of a shipmaster of Connecticut. He removed with his mother to Key West, Fla., in 1821, and was admitted to the bar there in 1833. Pres. Jackson appointed him inspector of customs, and in 1845 he became collector of the port of Key West. He was elected U. S. Senator from Florida in 1851, but during the secession movement resigned. He was appointed secretary of the navy in the Confederate government, and after the war was imprisoned. He was released on parole in 1866 and pardoned in 1867. He practised law at Pensacola, Fla., and died there, Nov. 9, 1873.

MANCHESTER, the largest city of New Hampshire and one of the seats of justice of Hillsborough county, is chiefly on the E. bank of the Merrimack River, 16 miles S. of Concord. It is on the Boston, Lowell, and Concord Railroad, and at the junction of railroads to Lawrence, Portsmouth, and North Weare. Its principal streets are wide and finely shaded with elms. It has a city-hall, a court-house, a large city-library, a State reform school, a convent, an orphanage, many handsome churches, 4 national banks, 5 savings banks, 4 weekly and 2 daily newspapers, 2 opera-houses, and a high-school. In 1884 it was constituted a bishop's see of the Roman Catholic Church. The city has a copious water-supply, several public parks, gas and electric lights, and is the seat of extensive and varied manufactures. The river here passes the Amoskeag Falls, descending 54 feet. The water-power is rendered available by a canal. It is the fourth city in the Union in the value of its cotton and woollen manufactures, which are chiefly carried on in great brick factories standing near the river. The principal mills of this class are five in number. The city has also important manufactures of steam-fire-engines, locomotives, boots, shoes, leather, sewing-machines, wagons, edge-tools, paper, hosiery, and other goods. Manchester was incorporated as Derryfield in 1751, a considerable proportion of the first settlers being of Scotch-Irish stock. It took the name of Manchester in 1810, and was chartered as a city in 1846. The population in 1870 was 23,536; in 1880, 32,630.

MANCINI, Pasquale, an Italian statesman, was born at Naples in 1820. He graduated at the university of that city and was made professor of jurisprudence there. He was a member of the Neapolitan parliament in 1848, and was prominent in opposition to the king. He was then obliged to flee to Turin, where he became professor of international law. He entered the Sardinian parliament, and in 1860 became minister of justice and religion at Naples. He was a leader of the liberal party in the first Italian parliament in 1861, and in 1862 was for a short time minister of education. Attending the Peace Congress at Ghent in 1873 as delegate from Italy he was chosen its president. He resides at Rome, where he is professor in the university as well as deputy in parliament. He has published *Diritto Internazionale* (1873).

His wife, **Laura Beatrice Oliva Mancini** (1823–1869), was a noted poetess. Having married in 1840 against the wishes of her family she composed a play on the circumstances of the case, which was performed in 1845. Many of her poems had reference to the political condition of Italy.

MANDANS, a tribe of Western Indians, belonging to the Dakota family and noted for their unusual lightness of complexion, so that they have acquired the name of the "White Indians." Gray hair is common, even in young people. They were more advanced when discovered than the surrounding tribes, had well-built villages, surrounded by earth walls, and practised agriculture. When first known, near the close of the eighteenth century, they were situated on the Upper Missouri and had nine villages. When visited by the expedition of Lewis and Clarke in 1803 their villages were reduced to two through the hostile invasions of the Sioux. They have always been friendly to the whites, and have made several treaties with the United States. In 1837 the tribe was almost swept away by small-pox, being reduced from 2500 to 145, mostly women and children. Since then they have increased to about 500. They are now, in company with the Arickarees and the Minetaries, on a large reservation of 8,640,000 acres, on the Yellowstone River, in North-western Dakota and Eastern Montana. The government appropriates $75,000 yearly for the three tribes. They live mainly by agriculture, are peaceful and friendly, but have taken no considerable steps towards civilization.

See Vol. XV. p. 486 Am. ed. (p. 479 Edin. ed.).

MANGANESE. This metal occurs as an essential component of several well-known minerals and in small quantities in others. It is closely allied to iron, with whose ores it is frequently associated, or accompanies in masses of manganese ore. All the manganese minerals contain iron, though at times in minute quantity. Until recently the important manganese ores of the United States were pyrolusite (MnO_2), or black oxide, and braunite (Mn_2O_3), or brown oxide of manganese. Recently an ore called bog manganese has become an article of commerce. The United States possess unusually extensive deposits of manganese as compared with other countries. These are irregularly distributed in the Atlantic States from Maine to Georgia. From Maine to Pennsylvania the bog ore is the common one. From Maryland to Georgia the black oxide is much more common. These deposits of black oxide are the most important sources of American manganese, being those mined at the Crimora mine of Augusta co., Va., much the most productive of American mines. The chief rivals of the Virginia mines are those of Barton co., Ga. Recently manganese is being mined in Arkansas, though as yet to no important extent. Manganese ores also exist on the Pacific slope. Heavy deposits are said to occur in California and Nevada, and considerable in the Rocky Mountain region. The only deposit in this region yet worked to any extent is that on Red Rock Island in San Francisco Bay. Nova Scotia yields an ore of considerable value from its unusual freedom from iron. This makes it useful in the glass manufacture, since it neutralizes the green tint which iron gives to glass. In Europe the richest deposits of pure ores are those of Spain and Portugal, from which large quantities are shipped to England. The statistics of the manganese industry for 1883 and 1884, which closely approximate to correctness, give the product of the United States at 8000 long tons for the former and 10,000 for the latter year. Of this Virginia yielded fully 75 per cent., Arkansas 20, and Georgia and North Carolina the remainder. Formerly Virginia yielded nearly the whole used. By the end of 1884 the Crimora mine had yielded in all 28,051 long tons. The foreign product is much greater. In 1874 Germany yielded 18,725 tons and Spain 48,207, with smaller amounts from other countries.

Manganese is not used as a separate metal but as an alloy or as a source of oxygen. In the latter ores rich in manganese dioxide are employed. When heated strongly, or treated with powerful acids, they form a convenient source of pure oxygen. Their ordinary use is as a convenient oxydizing agent in the preparation of other elements, such as chlorine and bromine. As an alloy it is combined with steel in small quantities. Within the past few years the manufacture of Bessemer steel has consumed most of our native product of manganese ore. What is the real benefit imparted by manganese to steel is not well settled, but its use is deemed highly important. It is used in this industry in the form of spiegel iron, in which the iron is alloyed with manganese. Alloys of copper, such as brass and bronze, are made much denser and harder by the addition of manganese. These are much used in England of late years for main bearings, top and end brasses, crank-pins, etc., on large steamers. For fuller information on this subject see David T. Day's article on Manganese in the *Mineral Resources of the United States for* 1883 *and* 1884.

MANISTEE, a city of Michigan, seat of justice of Manistee county, is on Lake Michigan, 135 miles N. W. of Lansing, and at the mouth of Manistee River. It is the terminus of a branch of the Flint and Père Marquette Railway. It has a court-house, 2 public halls, 4 hotels, 2 national banks, 4 weekly newspapers, a high-school, 11 churches, gas-works, 3 foundries, and a public water-supply. Valuation, $2,500,000. Manistee is a great seat of the manufacture and sale of sawed and planed lumber, and especially of shingles, its product of shingles surpassing that of any other town in the world. Its saw-, shingle-, and planing-mills are large and very numerous. There are 10 salt-works, the region being underlaid by a bed of salt 30 feet thick. Manistee was incorporated in 1867, and was destroyed by fire in 1871. Population in 1870, 3343; in 1880, 6930; in 1884 (State census), 10,373.

See Vol. XV. p. 497 Am. ed. (p. 490 Edin. ed.).

MANITOBA. The *climate* of Manitoba much resembles that of Northern Dakota; but it is important to remember that the Winnipeg basin, and most of the well-settled parts of the province, are much lower in elevation above the sea level than are the fine wheat-lands of Dakota and Minnesota. At Breckenridge, Minn., the Red River has the elevation of 953 feet. At the boundary line the river's elevation is 792 feet, and at the city of Winnipeg only 640 feet. Great expectations are entertained of the future of the province as a cattle-raising country. There are vast areas, not only on the plains, but in the broken Laurentian regions of the east and the north, which will afford excellent summer pasturage. The bison formerly ranged the country at will, and far to the west there are still some herds of that species which winter in the mountain valleys. The present very general occupation for cattle-ranges of a great proportion of all the available lands in the United States not required and adapted for actual cultivation, will undoubtedly stimulate the ranching business throughout a large area of Canadian territory. As to how far northward *sheep-husbandry* may be carried, no limit can yet be assigned. The sheep-like musk-ox lives as far north as the shores of the Arctic Ocean, feeding on the scanty herbage of the "barren grounds" the year through. Some writers have even proposed its domestication as a wool-bearing animal. It is probable that hardy North Russian breeds of sheep, or perhaps the Icelandic stock, will be found adapted to a range of country far to the north of any place where any kind of stock-raising has been yet tried in North America. It has been proposed to turn the Indian tribes of the North-west into stock-raisers, since the recent extension of civilization into their country is fast cutting them off from their old sources of livelihood, which were chiefly the trapping and shooting of game and of furred animals. Many of these Indians are either communicants or catechumens of the Roman Catholic Church; but some of the tribes are under the instruction of Church of England missionaries, and have made excellent progress under their instructions. Points far away from the railways and steamboats are in general reached in summer by canoes manned with Indian or Canadian voyageurs; in winter often by no better conveyance than sledges drawn by dogs. Except in the settled districts, trade is still conducted by the agents of the Hudson Bay Company.

The principal crop of Manitoba and the North-west generally is wheat. The varieties grown are altogether of the kinds known collectively as spring wheat. The ground is preferably ploughed in the autumn. Some cultivators, in favorable localities, sow their grain late in the autumn—so late, in fact, that it will not germinate until spring. Late-sown spring wheat will sometimes fail to ripen. The best grades of "number one hard" Manitoba wheat are not excelled in price, nor in excellence of bread-making quality, by any grain in the world, although some others produce better pastry flour. The area adapted to wheat raising expands rapidly to the northward as we go west from the Red River Valley, and is said to extend beyond the Peace River. Its northern limit is said to approach within 800 miles of the Arctic Ocean. It is reported that both soil and climate improve, up to a certain remote limit, as we go towards the north-west. The influence of the Pacific Ocean, which renders the climate of Southern Alaska and the British Columbian coast relatively very mild, has in like manner, it would appear, a favorable influence even east of the Rocky Mountains. Besides wheat, considerable quantities of barley are exported, and pease, potatoes, melons, and all the ordinary root crops of North America do remarkably well in Manitoba, as well as hops (which grow wild) and flax. Pending the exploitation of the fine deposits of lignitic coal which abound in the country, many farmers use hay, straw, and flax for fuel. This practice, introduced by the German-Russian Mennonites, has now become very common; and, when hay is burned in certain cheap and unpatented stoves of recent American invention, it is very effective as a heating material, and its use is not attended by any great inconvenience.

The great drawback to the enjoyment of life in Manitoba is not the severe cold of winter (for that can be guarded against, and need not cause danger to life or health) so much as the undue length of that season.

The *land laws* are exceedingly favorable to actual settlers, who, if aliens, must take the oath of allegiance before entering homestead lands for occupation. Besides the homestead, the settler is allowed a further pre-emption of land. The land lies in successive levels (called here "steppes" or benches), of which the lowest is near the level of the great rivers; hence, in some places, it is liable to overflow, and in spring the mud is in some places almost impassable. The higher levels are dryer, if somewhat less fertile. Even the subsoil is often rich in plant-food. In some seasons the Rocky Mountain locust or "hateful grasshopper" (*Caloptenus spretus*) has ruined the crops. (See LOCUST.)

The Laurentian districts of the north and east are hilly and stony, and in many parts barren; but there are beautiful and fertile tracts, the water-power is abundant, and the timber generally good, while the mineral resources, as yet unexplored, are thought to be very rich. This whole region, poor as it is generally considered, gives a rich return in furs to the trader; and it abounds in streams splendidly stocked with trout, grayling, and other game fishes.

An important event in the recent history of this province was the completion of the Canadian Pacific Railway, on which the first train ran from sea to sea in the autumn of 1885. This new highway is expected to open the Asiatic markets to the productions of this province. Of this railway several branches are now in operation within the limits of Manitoba. Great interest attaches also to the proposed railways which are intended to connect the province with the Hudson Bay ports. Unless unexpected difficulties should arise, these railways will greatly facilitate the laying down of Manitoba wheat in European ports, since the actual distance in miles is less from any port on Hudson Bay to Great Britain than from Montreal itself. This subject has awakened great interest, not only in Canada, but in Dakota and the adjoining parts of the United States. Another important event for the province, and for the whole dominion, was the final settlement, in 1884, of the North-western boundary lines of the province of Ontario. This gives (it is alleged) something like 100,000 square miles of disputed territory to Ontario, and prevents its annexation to Manitoba. This decision is considered adverse to the interests of the Roman Catholic, or rather French Canadian, party of the dominion, which had hoped to found in Manitoba a new seat of political strength. The recent conflict of arms in the new district of Assiniboia (not to be confounded with the former district of that name, now included in Manitoba itself) was indirectly connected with the same party conflict. Louis Riel, the leading spirit of the Assiniboia insurgents of 1884–85, had also headed the Manitoba rebellion of 1870; and his execution, which took place at Regina in 1885, was strenuously opposed by the French-speaking element throughout the dominion. The immediate cause of the last rebellion was said to be the dominion survey of lands held by Indians and half-breeds in the North-west, who looked upon that survey as the precursor of the distribution of the lands to white settlers. It is but just to add that the Roman Catholic clergy disclaimed any sympathy with Riel's second insurrection. Riel himself had left the church of his youth, and throughout the struggle was looked upon as an apostate from the faith, to which, however, he returned after his capture. (C. W. G.)

MANITOWOC, a city of Wisconsin, county-seat of Manitowoc county, is on the W. shore of Lake Michigan, at the mouth of Manitowoc River. By the Milwaukee, Lake Shore, and Western Railroad it is 77 miles N. of Milwaukee. It has a good port, and is the seat of active ship-building. The city has a court-house, many churches, a national bank, 4 weekly newspapers, lumber-, stave-, and furniture-mills, and is the seat of a brisk trade. Machinery, tools, castings, and leather are also manufactured. The town is pleasantly situated, its site being in part enclosed by low hills. It is the chief market for a large extent of fertile country. Population in 1880, 6367.

MANKATO, a city of Minnesota, seat of justice of Blue Earth county, is on the Minnesota River, below the mouth of the Blue Earth or Mankato River, 86 miles S. W. of St. Paul. Three lines of railway pass through this city. It is the seat of a State normal-school, and has a city-hall, court-house, 16 churches, a public library, a Roman Catholic college, 9 hotels, 2 national banks, 1 private bank, 6 weekly newspapers, and carries on manufactures of tiles, flour, oil, woollens, tubs, pails, brick, cement, paving-blocks, pipes, and other goods. It is handsomely laid out, with wide and shaded streets. The town is gas-lighted, and has a public water-supply and a small park. The property valuation is $2,349,000; and the public debt, $108,000. Mankato was settled in 1853, and incorporated in 1868. The surrounding country is very fertile and pleasant. The population in 1870 was 3482; in 1880, 5550.

MANLY, Basil (1798–1868), an American clergyman, was born at Pittsboro; Chatham co., N. C., Jan. 28, 1798. He joined the Baptist church in 1814, and was licensed as a preacher in 1818. He graduated at South Carolina College in 1821, and held pastorates at Edgefield (1822–25) and at Charleston (1826–37). He was active in establishing Furman University at Greenville, S. C., and in 1837 he was made president of Alabama University. He organized the Southern Baptist convention in 1845, and in 1855 resumed the pastorate at Charleston, and afterwards at Montgomery, Ala. In 1858 he established a theological seminary at Greenville, S. C., where he died, Dec. 21, 1868. His *Treatise on Moral Science* was a favorite text-book in Southern colleges.

MANNERS, John James Robert, an English statesman, second son of the fifth Duke of Rutland, was born at Belvoir castle, Leicestershire, Dec. 13, 1818. He was educated at Eton and Trinity College, Cambridge, graduating M. A. in 1839. He took part in the movement for reviving the chivalric spirit of feudal times, the advocates of which were known as "Young England." In furtherance of this object he published a volume of poems called *England's Trust* (1841), which contains a famous couplet, expressing the spirit of that notable movement:

> "Let wealth and commerce, law and learning die,
> But leave us still our old nobility."

In 1841 he entered Parliament as member for Newark, and distinguished himself by his opposition to the repeal of the Corn Laws. He refused to follow Sir Robert Peel in his change of attitude on this measure, and henceforth identified himself completely with the Conservatives. In 1847 he was unsuccessful in his contest for Liverpool, and in 1849 for the city of London, but he represented Colchester, 1850–57, being in the meantime first commissioner of works in Lord Derby's administration in 1852. He held the same office with a seat in the cabinet in Lord Derby's second ministry (1858–59), and in his third (1866–67). Lord Manners has represented North Leicestershire since 1857. In 1874, on the return of the Conservatives to power under Disraeli, he was made postmaster-general, which post he held till 1880. He has been a staunch defender of the Church of England, and a supporter of the agricultural interest. He has published *A Plea for National Holy Days* (1843); *Notes of an Irish Tour* (1849); *Notes of a Cruise in Scotch Waters in* 1848 (1850); *English Ballads and other Poems* (1850); and several lectures and speeches.

MANNING, Henry Edward, an English prelate and cardinal, was born at Totteridge, Hertfordshire, July 15, 1808. He was educated at Harrow and Balliol College, Oxford, graduating in 1830, when he was chosen fellow of Merton College. In 1834 he was appointed rector of Lavington and Graffham in Sussex, and in 1840 was made archdeacon of Chichester. He became noted as a preacher, and published some volumes of sermons. His *Essay on the Unity of the Church* (1842) gave him a prominent place among the Oxonians, who were endeavoring to restore in the Anglican communion the mediæval view of the church. For a time they seemed likely to prevail, but the complications of a state church proved too great. The Gorham decision (1850), in which the British privy council, reversing the judgment of the court of arches, held that the doctrine of baptismal regeneration is an open question in the Church of England, led to a protest from Dr. Manning and 14 other clergymen. But as they were unable by subsequent action to procure any further action in the matter, Dr. Manning abandoned the Church of England, and in 1851 was received into the Roman Catholic Church. Proceeding to Rome, he remained there for some years. He was ordained priest by Cardinal Wiseman in 1857, and appointed rector of St. Helen's and St. Mary's, Bayswater. He was also made provost of the diocese of Westminster, with the rank of prothonotary apostolic. On the death of Cardinal Wiseman Pope Pius IX. nominated Dr. Manning archbishop of Westminster, and he was consecrated June 8, 1865. He devoted himself energetically to the welfare of his diocese, establishing parochial schools, promoting temperance, and organizing benevolent societies among the poor. He also took a prominent part in discussing the questions of the time, so far as they affected directly or indirectly the Roman Catholic Church and its doctrines. On the great ecclesiastical questions he gave no uncertain sound. He was one of the early advocates of the opportuneness of declaring the papal infallibility, and in this behalf opposed Bishop Dupanloup. After the Vatican Council had been held he defended its decrees against attacks by Mr. Gladstone and others. In July, 1869, Archbishop Manning dedicated the pro-cathedral of Our Lady of Victories, Kensington, London. In 1871 he made a public appeal for a Roman Catholic university, which resulted in the opening of such an institution at Kensington, Oct. 15, 1874. Dr. Manning was created a cardinal-priest March 15, 1875, and was invested with the cardinal's hat at the Vatican, Dec. 31, 1877. Among Archbishop Manning's publications since he entered the Roman Catholic Church are *The Temporal Mission of the Holy Ghost* (1865); *The Temporal Power of the Pope in its Political Aspect* (1866); *England and Christendom* (1867); *The Fourfold Sovereignty of God* (1871); *Petri Privilegium* (1871); *The Internal Mission of the Holy Ghost* (1875); besides many sermons and pamphlets.

MANNING, James (1738–1791), an American clergyman and educator, was born at Elizabethtown, N. J., Oct. 22, 1738. He graduated at Princeton College in 1762, and was ordained pastor of a Baptist church at Morristown, N. J., in 1763. In that year he drew up the plan of a Baptist college, for which a charter was obtained from Rhode Island in 1764 (see Brown University, Vol. I., p. 661). The college was opened at Warren, R. I., in 1765, with Mr. Manning as president, but in 1770 it was removed to Providence, where he became also pastor of the First Baptist church. In 1785 he was elected to Congress, but remained only six months. In 1790 he resigned the presidency of the college, and in the next year his pastorate. He died at Providence, R. I., July 24,

1791. See *Life, Times, and Correspondence of James Manning*, by R. A. Guild (1864).

MANSFIELD, a city of Ohio, seat of justice of Richland county, is handsomely situated on hilly ground, 179 miles N. E. of Cincinnati, and is on the Pittsburg, Fort Wayne, and Chicago, the Baltimore and Ohio (Lake Erie Division), the New York, Pennsylvania, and Ohio, and the North-western Ohio Railroads. The city has 8 hotels, 2 national and 2 other banks, 5 weekly and 2 daily newspapers, 10 churches, and a business college. It has a good trade and large manufactures of flour, agricultural machinery, stoves, suspenders, bent-wood wares, castings, tiles, carriages, and other goods. It is lighted with gas and electricity, and has Holly water-works and a public park. The town was settled in 1808 and incorporated in 1828. Population in 1880, 9859.

MANSFIELD, Edward Deering (1801–1880), an American journalist, was born at New Haven, Conn., Aug. 17, 1801. He graduated at West Point in 1819, but relinquished the army for the law. He was admitted to the bar in Connecticut, but immediately removed to Cincinnati, and in 1836–37 he was professor of constitutional law in Cincinnati College. He was editor of several newspapers and also of the *Railroad Record* (1854–72). From 1857 to 1867 he was commissioner of statistics for the State of Ohio. He contributed to the *New York Times* for several years over the signature "Veteran Observer." Among his publications are, *Political Grammar* (1835); *Constitutional Law* (1835); *Legal Rights of Women* (1845); *History of the Mexican War* (1848); *American Education* (1850); *Memoirs of Daniel Drake* (1855). He died Oct. 27, 1880.

MANSFIELD, Jared (1759–1830), an American engineer, father of the preceding, was born at New Haven, Conn., in 1759. He graduated at Yale College in 1777, and became a teacher of mathematics in New Haven, and afterwards in Philadelphia. He was appointed captain of U. S. engineers in May, 1802, and taught for a time at West Point. He was U. S. surveyor-general of Ohio and the North-west Territory from 1803 to 1812, rising meantime to the rank of lieutenant-colonel. In 1812 he returned to West Point as professor of natural and experimental philosophy, and resigned this position Aug. 31, 1828. He died at New Haven, Conn., Feb. 3, 1830.

MANSFIELD, Joseph King Fenno (1803–1862), an American general, nephew of the preceding, was born at New Haven, Conn., Dec. 22, 1803. He graduated at West Point in 1822, and, entering the engineer' corps, was employed in coast and harbor defences. In the Mexican war he served with Gen. Taylor as chief-engineer, and received three brevets for bravery. In May, 1853, he became inspector-general, and on the outbreak of the civil war he was made brigadier-general. He commanded the department of Washington and fortified that city on every side. He afterwards served at Cape Hatteras, Newport News, and at Suffolk, Va. Having succeeded Gen. N. P. Banks in command of a corps, he was mortally wounded at the battle of Antietam, and died Sept. 18, 1862.

MANT, Richard (1776–1848), an English prelate, was born at Southampton, Feb. 12, 1776. He was educated at Winchester and at Trinity College, Oxford, and became a fellow of Oriel College in 1798. He was curate at Southampton in 1802, and afterwards held charges in London. He was made bishop of Killaloe in 1820, and of Down and Connor in 1828. To this diocese Dromore was attached in 1842. He is chiefly known by the *Annotated Bible* which he prepared in connection with Rev. George D'Oyly (1814). He also issued an *Annotated Book of Common Prayer* (1820) and published a *History of the Church of Ireland* (2 vols., 1839–41). His metrical version of the Book of Psalms (1842) and *Ancient Hymns from the Roman Breviary* (1837) have considerable merit. He died at Ballymoney, Ireland, Nov. 2, 1848.

MANTEUFFEL, Karl Rochus Edwin, Baron, a German general, was born at Magdeburg, Feb. 24, 1809. He entered the military service in 1826, and became aide-de-camp to the king in 1848, and chief of the military cabinet in 1857. He was promoted to the rank of lieutenant-general in 1861. He had often been employed in diplomatic work, and in 1864 secured the co-operation of Austria in the Schleswig-Holstein war. He was afterwards governor of Schleswig, from which he conducted vigorous movements against Holstein and Hanover. In the Austro-Prussian war of 1866 Manteuffel was commander-in-chief of the army of the Main, and treated the city of Frankfort very harshly. He afterwards retired from military service, but was recalled in 1868. In the Franco-German war he commanded the First Prussian army corps, before Metz, and after the surrender of Bazaine received command of the first army which marched into Northern France. He captured several cities, but his success was not as brilliant as that of the other Prussian armies. In January, 1871, he received the command of the South German troops, and was sent against the French army of the East under Bourbaki. Attacking this army on the flank as it retreated from Belfort he drove it over the Swiss frontier and thus ended the war. In June, 1871, he was made commander-in-chief of the army of occupation, and discharged the important duties of this responsible position with great ability until 1873, when the Germans retired from France. On Sept. 19, 1873, he received the rank of field-marshal. In 1876, and again in 1879, he went on a diplomatic mission to Warsaw. In July, 1879, he was made governor of Alsace, where he exerted himself to conciliate the people.

MANUFACTURES. The term "manufactures" is now distinctively employed to describe the processes and products of productive industries, or of industries engaged in fitting crude materials and natural growths for the higher uses of man in society. Primarily these changes of natural forms were made by the hand of the artificer or hand-worker, and hence they were called manufactures, but in recent times machinery has by far the largest place in effecting these changes of form. Wood, iron, and other materials are shaped and changed by machinery; and wool, cotton, silk, and flax assume all their forms of adaptation to final use almost solely through the agency of machinery. It would not now be practicable to express this fact in the form of the definition afforded by a single descriptive word, however, and "manufactures" will remain as the expression for all the products reformed, shaped, fashioned, and combined in order to adapt them to the uses of man in society. The general use of the term manufactures scarcely dates back a full century, although Spain, Flanders, and Holland long preceded England in the use of improved looms, if not of machinery, for spinning. Fabrics of wool, silk, and flax were the product of more costly materials than the cotton of English spinning, and economy in their manipulation was not so necessary. The struggle to control these materials themselves, especially wool and silk, was a characteristic feature, both of legislation and of social movements, for a century or more before the era of cotton, which came abruptly in 1780. Cotton was rapidly advanced to so great a place that in 1861, according to a paper read by Mr. Bazley, a member of Parliament, its manufacture had then "yielded a profit of not less than *one thousand millions of pounds sterling* ($5,000,000,000) to the people of the United Kingdom." See E. B. Bigelow, *The Policy of England* (1862).

The earliest efforts of the founders of the American Republic were directed towards the establishment of manufactures as an assurance of national independence and an essential condition of public prosperity. Alexander Hamilton made a report on manufactures, Dec. 5, 1791, in pursuance of an order of the House of Representatives, Jan. 15, 1790, which had the most important influence, and was remarkable for its broad and wise forecast of the future of the country. In this report he cites the then recent growth of the cotton manufacture in England and the powerful agency of machinery. "The cotton-mill, invented in England within the last 20 years, is a signal illustration of the general proposition" that machinery would effect great changes. "To this invention is to be attributed the immense progress which has been so suddenly made in Great Britain in the various fabrics of cotton." "The foreign demand for agricultural produce is an uncertain reliance: a better substitute is an extensive domestic market, and to secure this there is no other expedient than to promote manufactures." The definitive use of this term, as applied to industries conducted by machinery rather than by hand labor, began with the growth of the cotton-mills in England about 1770, and from 1790 to the present time the broader sense, attaching to a system or a policy quite as much as to a process, has continued as its permanent definition.

Boston had a "Society for Encouraging Industry" in 1758, and "A Manufactory Sermon" was delivered before it by Rev. Thomas Barnard, Sept. 20, 1758, in which he strongly urged "An industrious prosecution of the arts of civil life" as "very friendly to virtue." "Too much land has proved more inconvenient than too little," he said, and urged his people to make such "progress in arts and manufactures as will bring them in what they want from other countries." These were the teachings of the wisest men of colonial times, but the adverse social and commercial influences were too great to permit of much development until after the Revolution; and even then the policy of the new government was not sufficiently decisive and persistent to enable the domestic manufacturer to hold his ground against foreign competition. Individuals often attempted enterprises, especially in New England for cotton, silk, and woollen fabrics; in Pennsylvania for iron and machinery, and in Maryland, Virginia, and the Carolinas for more strictly domestic industries. In Rhode Island, Samuel Slater began building in 1792, and a company at Paterson, N. J., in 1794; Jacob Broome in Delaware in 1795; Samuel Wetherill in Philadelphia in 1782; all being for the manufacture of cotton goods made by power machinery. During this period the utilization of water power was the great object, and the falls of the Merrimack, at Haverhill, and the Amoskeag Falls in New Hampshire were improved extensively by Samuel Blodget, who built a duck factory at Haverhill in 1775, and a canal at Amoskeag with extensive saw-mills in 1794 to 1807, designing to make that site the "Manchester of America," as it has since become. The general interest in manufactures, which was aroused by the census of 1810, was further stimulated by the war of 1812, and great efforts were made to supply the country with manufactured goods made at home. The cotton industry began with more energy and was continued more successfully in New England, and the great works at Lowell and Amoskeag, now Manchester, grew up from 1815 to 1825, so that in the year 1826 New England contained 400 distinct cotton factories, having 280,000 power spindles, although half the looms were still hand looms, however. In 1816 the prostration of manufactures, caused by the flood of imports following on the peace of 1815, brought out many complaints and developed strong organizations for the restoration of protective duties. As a result the tariff act of 1816 was enacted, which was intended to increase rates considerably, but which by the use of provisions reducing many of the rates at the end of two years, really worked injuriously to all who attempted manufactures. The customs duties were in 1815, $36,306,022; in 1816, $27,484,109; in 1817, $17,524,775; in 1818, $21,828,451. These imports of 1815 and 1816 were largely of cotton, woollen, and silk goods, and it took some time to bring the factories into operation after the prostration caused by these floods of foreign fabrics. The public agitation was great in Philadelphia, Baltimore, and New York. Mathew Carey, Hezekiah Niles, Henry Clay, J. C. Calhoun, and many other persons of distinction wrote largely and made every personal and public exertion to encourage and protect manufactures. John C. Calhoun said that "manufactures produced an interest strictly American as much as agriculture." "In this it had the decided advantage over commerce and navigation, and the country will derive from it new resources. It is calculated to bind more closely together our wide-spread republic." Mathew Carey published many papers from 1816 to 1824, and especially the *Olive Branch*, strenuously advocating the protection of manufactures. The Philadelphia Society for the Promotion of Domestic Industry issued an address in 1819, reviewing the history of English, Prussian, and Russian efforts to establish manufactures. The Delaware Society for the Promotion of Manufactures, in a memorial to Congress, October, 1817 (presented Jan. 7, 1818), stated that the manufactures on the Brandywine, near Wilmington, had disbursed $500,000 annually, and claimed that the "public good requires of the government to restrain by duties the importation of articles which may be produced at home, and to manufacture as much as possible of the raw material of the country. That the branches of industry particularly necessary or useful to the independence of the community ought to be encouraged by the government." A like memorial from the Philadelphia Society was presented, Feb. 10, 1818.

Progress by the Census Decades.—The census enumerations of 1790 to 1800 were of population only, but that of 1810 embraced a form on which "Manufactures" were to be returned, and a compilation of the returns so made was prepared by Tench Coxe, Dec. 8, 1812, and printed in quarto form, with full detail by States of such returns as were received. The imperfect character of these returns is very apparent, but the actual total of $127,694,602 as returned, was corrected by estimate to $172,762,676, which probably expresses the full value of the industrial products of the country at that date. For the next three decades, 1820, 1830, and 1840, the returns made in the schedules of "Manufactures" were too imperfect in every respect to constitute any basis of comparison, and it was not until 1850 that the method of reporting and compiling such statistics became trustworthy. For that year, and for each of the censuses to 1880, an approximate comparison can be made as follows:

Year.	Population.	Persons employed.	Per cent.	Values produced.	Value for each.	Year's wages of each.
1850	23,191,784	957,059	4.126	$1,019,166,616	$1,065	$247.27
1860	31,443,421	1,311,246	4.171	1,885,861,676	1,438	288.94
1870	38,558,371	2,053,996	5.327	4,232,325,432	2,060	377.60
1880	50,155,783	2,732,595	5.448	5,369,579,191	1,965	346.63

The household manufactures existing from colonial times, and made by the hands and looms of the members of each family, produced a considerable share of the fabrics now made by machinery and in distinct establishments, and this continued until 1850 very generally, and in some degree until 1860, but they have not been reported in any census since 1860. The development of machinery and the increased use of steam-power made rapid advances from 1850 to 1870, and still more from 1870 to 1880. Since the last census the growth of power appliances has been cumulative, the result being a much greater productive force and an increase of the number of persons employed, and also in the quantities produced, much above the condition of any former period in this respect.

Progress of the Towns and Cities.—Manufactures have become the great resource of towns and cities in the United States, more than is generally the case in continental Europe, and in a greater diversity, if not in a greater proportion, than in the towns of England. A large number of villages and cities are devoted chiefly to manufactures in New England and the Middle States, in which from 25 to 35 per cent. of the population are employed at wages in the mills and factories, and nearly all the population derive their support directly or indirectly from these industries. But the more striking feature of the recent growth of city industries is shown in the statistics of 20 cities having the largest population, as given for the census of 1880. In those 20 cities, ranging from 116,340 population for Detroit to 1,206,299 for New York, the number of manufactories was 56,360, with 992,059 persons employed, to whom was paid $397,806,525 as wages, and producing $2,109,492,841 in value of manufactured articles in the census year; being $2116⅓ produced for each person, and $401 average paid to each as wages. The percentage of the total population so employed is 15.9, or excluding two-fifths, being those under 15 and over 70, the percentage of the adult population so employed is 26.6. The highest ratio is at Pittsburg, 23.6 per cent. of the whole population; Newark, 22; Philadelphia, 21.9; Cincinnati, 21.4; New York, 18.9, etc. The corrected city census of Philadelphia for 1882–83 gives a larger number and larger proportion employed in manufactures, or 242,483 in a population of 925,725, equal to 26.2 per cent. An increasing proportion of females and young persons was so employed in this later census, and the rate of annual earnings was less, for this reason; being $346 for each person only; but the values produced were $1992 for each person, and $481,226,309 for the whole. The ratio of annual progress in these industries increases each year because of the introduction of better machinery, and may be taken at 5 per cent. average annual gain as to values, and 7 per cent. as to quantities for the six years from 1879–80 to 1885–86. There was an increase of 10 to 15 per cent. in 1881–82, and a partial check in 1884–85, followed by an increase of 15 per cent. in 1885–86. Taking in each case periods corresponding to the census year ending with June 1. This growth since 1880 has been most marked in the textile industries, and in the towns and cities as distinguished from the country generally. Since 1882 it has been greater in the Southern States than before, and not less than 10 per cent. annually, the several classes being all advanced, although the advance is more conspicuous in cotton fabrics, oils, iron, and machinery.

Leading Classes of Manufactures.—By the census of 1880 there were 332 classes of manufactures named in the general table, but this was a much more condensed classification than is usual; a local census of 1882 named 525 classes for Philadelphia. The number naturally distinct, and requiring separate processes with distinct machinery is about 1000; and it is not possible to determine where many important ones were placed in the compilations of the last U. S. census, if they were taken at all—such as canned meats, fish, lobsters, fruits and vegetables, refined petroleum, and many others, most of which do not appear to have been reported. The more important classes here, as in Europe, are textile fabrics of wool, cotton, and silk; iron and steel and manufactures of iron and steel; clothing and articles worn; leather and manufactures of leather; spirits and liquors, malt and distilled; wood manufactures, cars, carriages, and implements of wood and iron; chemicals, drugs, and medicines; oils and paints; flour and meal; meats and provisions, cured; house furniture; glass and glass-ware, earthen-ware and pottery; paper and manufactures of paper; printing and publishing; sugar refined, confectionery, etc. The accompanying table gives the more important figures for the leading classes: those for textile fabrics, given under woollens, include all worsteds, carpets, wool hats, feltings, and hand-knit goods, and one-half in each case of "mixed textiles," of "hosiery," and "dyeing and finishing textiles;" the other half in each case of division going to cottons, etc. In silk manufactures is also included "upholstering materials." The values given are now much greater than in 1879–80, and not less than $400,000,000 for woollens, $375,000,000 for cottons, and $65,000,000 for silk goods. "Iron and steel" would now be $350,000,000 in value; machinery and manufactures of iron and steel, $450,000,000, and manufactures in part of iron and steel (cars, carriages, agricultural implements, railway tracks, bridges, etc.), $250,000,000. The consumption of wool in manufactures in 1885 was 428,836,708 pounds, as compared with 300,000,000 in the census year of 1879–80. The raw cotton taken by the mills of the United States for consumption increased from 1,570,344 bales in the census year to 2,500,000 bales in 1885, causing a corresponding increase in the value of manufactures of cotton. (See Table at top of next page.)

The returns for several of these industries are quite imperfect and far short of their value at that time, and therefore but a still smaller share of their value in 1886. Canned meats, fish, and lard, refined edible oils, oleomargarine and like animal products prepared for food, add perhaps $50,000,000 to the values above given, and for butter and cheese as dairy products the value is $35,000,000 more. Canned and preserved fruits and vegetables now reach $50,000,000 in value to be added to the values just named, all the processes of preparation requiring skill and power-machinery. The refining of petroleum and its putting up in sealed cans and otherwise for export and for domestic consumption is a manufacture amounting to $100,000,000 in value yearly; the export of such oils is very great, and the value of the lighter products and of paraffine is considerable. All the processes are elaborate, requiring large capital, skilled labor, and expensive machinery, with all the adjuncts of great establishments, barrel factories, canning factories, paint shops, and machine shops. The minor and household industries were all excluded from the census of 1880, as were also all products of reducing machinery in working ores and other products of mines. Most of the metals are brought into use only through the agency of costly and powerful machinery. Illuminating gas is an important manufacture not noted in the census, yet conforming to all the definitions necessary to establish its place. The preparation of fibres, flax, hemp, ramie, etc., is also a manufacture.

New Achievements in Manufactures.—Much of the conspicuous success of American manufactures has been due to the invention of superior machinery and to the introduction of new methods. The cotton-gin of Whitney is a preliminary process of manufacture. The carpet-loom of Bigelow revolutionized the manufacture of fine carpets in England as well as in the United States. The sewing-machine revolutionized the working of cloths, leather, and all fabrics used for personal wear. The invention of machinery to make the pointed wood-screw was a conspicuous achievement, and that of solid-head pins scarcely less. More important still was the method of manufacture for fire-arms, sewing-machines, watches, clocks, and many other classes by the use of mechanism for interchangeable parts, a reform of vast importance and one which English and German industries have been compelled to adopt. The entire reform has been American, and its application to the leading industries named, and to

Leading Manufactures. U. S. Census of 1880.

	Number of establishments.	Capital.	Number employed.	Wages paid.	Value of product.
Woollens, etc.	2,879	$183,579,811	179,014	$54,071,629	$302,375,215
Cottons, etc	1,515	252,399,719	232,115	58,860,716	274,793,558
Silk manufactures	461	20,815,500	32,814	9,670,122	42,860,750
Total textile manufactures	4,855	$456,795,030	443,943	$122,602,467	$620,029,523
Iron and steel	1,005	$230,971,884	140,975	$55,476,785	$296,557,685
Iron and steel manufactures	7,407	236,674,513	123,004	98,288,945	338,937,234
* Manufactures in part of iron and steel	5,914	109,355,841	99,306	39,855,978	161,589,694
Clothing and shirts	7,277	85,910,747	216,692	58,005,084	261,683,285
Boots and shoes	17,972	54,358,301	133,819	50,995,144	196,920,481
Leather, tanned	3,105	50,222,054	23,812	9,204,243	113,343,336
Leather, Morocco and kid	204	6,266,237	5,395	2,441,372	15,399,311
Leather, curried	2,319	16,878,520	11,053	4,845,413	71,351,297
Sugar, refined	53	27,797,500	6,207	2,937,303	155,767,487
Liquors, malt	2,191	91,208,224	26,220	12,198,053	101,058,385
Liquors, distilled	844	24,247,595	6,502	2,663,967	41,063,663
Flour and meal	24,338	177,361,878	58,407	17,422,316	505,185,712
"Slaughtering and meat-packing"	872	49,414,213	27,297	10,508.530	303,562,413
Paper	692	46,241,202	24,412	8,525,355	55,109,914
Printing and publishing	3,467	62,983,704	58,478	30,531,653	90,780,341
Lumber, sawed	25,708	181,186,122	147,956	31,845,974	233,268,729
Lumber, planed	1,203	17,612,903	15,289	5,890,724	36,803,356
Sash, doors, and blinds	1,288	20,457,670	21,898	8,540,930	36,621,325
House furniture	5,227	44,946,128	59,304	23,695,080	77,845,725
† "Chemicals and salt"	1,349	85,394,211	29,520	11,840,704	117,377,224
Tobacco and snuff	477	17,207,401	32,756	6,419,024	52,793,056
‡ Tobacco, cigars, and cigarettes	7,145	21,698,549	53,197	18,464,562	63,979,575
Glass and glassware	381	20,789,879	25,763	9,850,868	23,689,580
Earthen and stoneware	686	6,380,610	9,494	3,279,535	7,942,729
Oils, linseed	81	5,872,750	1,416	681,679	15,393,812
Oils, cottonseed	45	3,862,300	3,319	880,836	7,690,921
Oleomargarine	15	1,680,300	599	212,952	6,892,939
Starch	139	5,328,256	3,119	919,197	7,477,742
Cheese and butter	3,932	9,604,803	7,903	1,546,494	25,742,510

* Manufactures "in part of iron and steel" include agricultural implements, street and railroad cars, wagons and carriages, etc., as returned. There should be others, as elevators, tramways, turntables, bridges, etc.

† In this are included aniline colors, anthracene, ammonias, alum, borax, bromine, castor-oil, stearine candles, all soaps, glycerine, nitro-glycerine, manufactured fertilizers, all salts of lead, paints and colors, and potash, sulphuric acids, and glucose. With $44,927,161 in value of "all other products."

‡ The commissioner of internal revenue reports that 3,349,838,500 cigars and 1,172,653,000 cigarettes were made in the calendar year 1885, using 79,931,429 pounds of tobacco.

locks and bolts, house-building hardware, tools, agricultural implements, locomotive engines, carriages and wagons, etc., has given these products a world-wide celebrity. Brass faucets can be cut and finished by machinery almost automatic, attended by young persons and producing perfect faucets at a cost little more than the brass of those previously shaped and filed by hand. Fire-arms of elaborate pattern can be made in large establishments at the rate of 2 guns to each man in 3 days, 200 guns in 312 days, through the perfect subdivision of labor and perfect interchangeability of parts. Like economies in the manufacture of clocks and watches have accomplished the most remarkable results, cheapening them to a fraction of their former cost, and compelling the European watchmakers to adopt American methods. The comparison made with Swiss method shows that the average product of the Swiss method was 40 watches yearly per man, while the American watch machinery enabled each man to make 150 watches yearly per man. The works at Waltham, Mass., began the improved system in 1848, but it was not perfected for some years, and there are now but a few factories of the class, so great is their production. Watch-cases are a more recent special improvement, machinery for stamping, plating, engraving, etc., having been brought to great perfection. In clocks the economies effected by machinery have been even greater than in any other article or class, and the cost has been reduced to the smallest sum. As a result they are sent to every part of the world and sold at prices that defy competition. Similar improvements in the machinery employed in the silk manufacture have recently brought almost the entire production of handkerchiefs, ribbons, and narrow goods to the United States, compound looms being made on which 12 to 24 webs may be woven at one movement of the loom, and a single attendant can care for two such looms, thus weaving 24 to 48 webs at once. Dress goods woven in looms having a rapid motion and working automatically are now doubling the product of the usual looms on such goods in Europe. Changes in the machinery employed in all manufacturing processes on silk are constantly in progress, reducing the cost of labor and increasing the productiveness of the plant and factory.

Legislation to Encourage Manufactures.—The first act of Congress regulating commerce and imposing duties on imports was declared in the title to be "for the encouragement and protection of manufactures" as well as for revenue. This principle has since had a place in all legislation relating to import duties, although the degree or specific character of such encouragement has always been incidental to the more decided object of raising the revenue necessary to the support of the government. The legislation of England and of all European states is full of positive prohibitions, high restrictive duties levied without regard to revenue, and the most obstructive regulations[*] were maintained for many years. While intended in a general sense to encourage manufactures, none of the tariff acts from 1789 to 1860 was sufficiently high in its rates of duty to effect the substitution of fabrics made at home for those which it had been the custom to import, except during the obstruction to commerce caused by foreign wars. When such obstructions reduced the volume of imports, which was chiefly made up of manufactured goods, the later removal of such difficulty was followed by a very heavy importation. From 1795 to 1807 there was a large re-export trade of manufactures imported, but this fell off rapidly from 1808 to 1812, when it ceased for the period of the war, 1812 to 1815; and did not afterward rise to its former importance. The flood of imports in 1815 and 1816 almost destroyed domestic manufactures, and the effect of the acts of 1816, 1824, and 1828, although each intended to encourage manufactures, was inadequate to check importations materially, and not a sufficient protection to the manufacturers against the destructive competition of the better developed mills and machinery then at work in England. The greater proportion of manufactured goods imported during 1789 and 1790 paid 5 per cent. duty; in 1791, 7½ per cent.; in 1792 to 1794, 7½ and 10 per cent.; in 1795 to 1800, 10, 12½, and 15 per cent.; in 1801 to 1803, 12½ and 15 per cent.; in 1804 to 1811, 15 to 17½ per cent.; in 1812, 15 to 27½ per cent. During this period all wines and liquors, sugars, spices, tea, and coffee paid specific rates, as did also some forms of iron, steel, cordage, cigars, boots and shoes, glass, soap, cheese, etc.; these specific rates being equal to the *ad valorem* rates on other goods. The tariff of 1812 imposed additional war rates of 42 per cent. of those then in force, and this continued until the general tariff of April 27, 1816, which greatly reduced the rates prevailing during the war, and brought an overwhelming importation which ruined most of the manufactures then existing. No material change was subsequently made until the general act of May 22, 1824, which was fairly protective, and was intended to aid manufactures materially. Being still insufficient, however, the more strongly protective act of May 18, 1828, was passed, under the operation of which there was more encouragement to domestic manufacturers than at any former period. Strenuous efforts to repeal this tariff were made in 1832, resulting in the passage of the "compromise act" in 1833, under which a scale of annual reductions took effect, until nearly half the percentage of duty imposed was removed.

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[*] "In 1820 the whole commercial system (of England) was encumbered, disfigured, and shackled by innumerable vexatious, obstructive, and impolitic restrictions, that had come down from periods long anterior to the war. . . . . The number of acts of Parliament relating to the entry, export, and custody of goods was not less than 15,000. In 1840 there were no fewer than 1150 different rates of duty on imported articles."—BIGELOW.

The contest over the tariff in 1832 was the specific revolt of the planting interest, threatening nullification of the law as the alternative if the protective rates were not reduced, and the concession made by the act of March 2, 1833, was in deference to that demand. It proved very unfortunate and almost ruinous to manufactures of all classes, creating a strong reaction, and strenuous efforts to restore the protective features of former laws. This restoration was ultimately effected by the enactment of the act of Aug. 30, 1842, and continued until 1846, when the advent of a party favoring lower duties secured the passage of the special "revenue tariff" of July 30, 1846, all the rates of which were *ad valorem;* the rate of 25 per cent. applying to cotton, silk, worsted and woollen yarns; and 30 per cent. to woollens generally and to iron, steel, and metal goods. These rates were found in practice better than had been feared, and manufactures made considerable progress, while the revenues accumulated in a surplus, which induced the preparation of the bill of reductions of March 2, 1857. These were made in the simple form of changing the schedule rates; articles paying 100 per cent. and 40 per cent. in the act of 1846 were to pay 30 per cent., the 30 per cent. schedule to pay 24 per cent., the 25 per cent. schedule to pay 19 per cent., that at 20 per cent. 15 per cent., that at 15 per cent to pay 4 per cent., etc. These reductions were very injurious to manufactures, and a period of severe depression followed, with only a partial recovery in 1860. The revenues fell below the needs of the government, and on March 2, 1861, a new tariff act was framed, in many respects after the model of that of 1842, and particularly designed to encourage and protect manufactures. This was increased on some articles Aug. 5 and Dec. 24, 1861, and again by a general increase of 5 to 10 per cent. July 14, 1862. Further changes increasing duties were enacted March 3, 1863, and by a general re-enactment June 30, 1864. The rates on cotton goods were increased March 3, 1865, and on March 2, 1867, a new and complete schedule for wool and woollens replaced all former rates of duty on these articles. The principal features of the tariff laws have remained with little change since 1867, the increase of the free list in 1870 and again in 1872 having been in the way of favoring raw staples and not materially affecting manufactures. The revised statutes in 1874 condensed the acts and parts of acts then in force, and the general revision of the tariff enacted in 1883 made some changes and reductions, but generally adhered to the policy of encouraging and protecting manufactures.

Results of Legislative Encouragements.—Under the favoring legislation from 1861 to 1886 the manufactures of the country have grown to four times their magnitude in 1860, and have passed the point of doubt as to their adequacy to supply the domestic market. They also furnish one-third of the domestic exports, or $250,000,000 in value in a total of $750,000,000, which is the average value of domestic exports for the last two fiscal years. For the fiscal year ending June 30, 1885, the value of manufactures exported was $248,838,731, the leading items being as follows:

Agricultural imp's	$2,561,602
Books, maps, and art work	1,616,620
Brass manufactures	838,118
Bread, meal, and flour	55,107,198
Cars and carriages	1,864,528
Chemicals, dyes, and medicines	3,938,330
Clocks and watches	1,345,940
Cotton manufactures	11,836,591
Earthen and china ware	135,385
Fancy articles and perfumery	878,835
Fertilizers, mfd	910,778
Fish, salmon, canned	2,260,567
Flax and hemp mfs	1,364,140
Fruits, canned	473,944
Glass and glassware	783,915
Gunpowder and explosives	1,367,223
India rubber mfs	686,156
Ink	86,114
Instruments	449,587
Iron and steel, mfs. of	16,605,046
Jewelry	380,520
Lamps	522,597
Leather, mfs. of	9,692,408
Liquors, malt	491,418
Marble manufactures	513,505
Matches	69,840
Musical instruments	941,344
Oil, cake, and meal	6,674,466
Oils; illumin., ref. and manufactured	44,354,114
Oil; cotton seed	2,614,592
" other vegetable	73,803
" volatile or essent'l	245,872
Paraffine and wax	$1,725,344
Paints and colors	351,507
Paper and mfs. of	972,493
Plated ware	509,378
Provisions, beef can	4,214,791
Oleomargarine	4,451,632
Butter	3,643,646
Cheese	10,444,409
Silk manufactures	7,4610
Soaps	697,294
Spermaceti	63,683
Spirits, distilled	5,565,216
Spirits of turpentine	2,690,231
Starch	276,274
Stationery, not paper	395,123
Stereotype plates	28,596
Straw manufactures	41,935
Sugar refined	16,071,767
Confectionery	88,549
Tin manufactures	162,304
Tobacco manufactures	2,371,800
" cigars and cigarettes	369,719
Trunks and umbrellas	162,920
Varnish	134,103
Vegetables, canned	113,683
Vessels sold abroad	387,460
Wire	95,299
Lumber, sawed, staves, hoops, etc	12,086,296
Lumber, mfd. and house furniture	4,780,495
Wool manufactures	775,962
Zinc manufactures	4,991
Unenumerated	762,184
Total	$248,838,731

Bark extracts, bricks, brooms, candles, cocoa, copper, and many other items are not transcribed here.

The importation of manufactured articles constituted for the last fiscal year about one-half of the total imports, or $288,763,665, of a total of $577,527,329 imported. Large proportions of raw materials are now imported, as sugar, $68,531,495; coffee, $46,723,318; tea, $14,047,583; hides and skins, $20,586,443; animals, eggs, fish, barley and other grains, wool, leaf tobacco, fruits, rice, seeds, hemp and flax, crude rubber, ores, etc., to the value of $300,000,000; as against nearly $100,000,000 of dry goods, $35,000,000 in iron and metals, $20,000,000 in chemicals, etc., imported as manufactures. The imports of cotton, woollen and silk goods have declined 20 per cent. yearly, for two years past. The value of cotton manufactures was $27,197,241; flax and hemp manufactures, $20.492,376; silk manufactures, $27,467,565, and woollens, $35,776,559; together, $110,933,741, of which about $100,000,000 was in finished dry goods, the remainder being yarns, cordage, burlaps, bags, rugs, carpetings, etc. The exports of cotton-yard goods in 1884–85 was 147,544,718 square yards, value $10,150,237; while the imports of cotton-yard goods were 25,120,494 square yards, value $2,653,320 only. Manufactures as now developed have attained the highest value as a resource for the people of the older States and communities of this country, and they are prosecuted with greater energy because of the abundant capital now at command, and the readiness with which the best structure and most efficient machinery may be obtained. In this way the advantages of a concentration of force may be secured for almost every form of product, and improvements of such value secured as to reduce prices to the lowest point. The chief market being within immediate reach there is little loss from holding an unsalable surplus. Most manufacturers work only on orders, especially in the textile trades.

Manufacturing Machinery.—Reference has been made to the effectiveness of the special machinery invented for particular processes, and accomplishing unusual results. The precedence in such inventions must be awarded to the English as to time, but an equal degree of inventive skill has for half a century been shown in the United States, and many achievements are effected annually through the agency of which old industries are revolutionized, or new ones created. The building of machinery is a great industry of itself, employing one-third of all the establishments and force employed in making and using iron and steel. While the forms of new machinery are largely from the manufacturer who is struggling to obtain better results, yet they are almost equally the creation of the machinist in the forms they finally take for use. The aim is to dispense with hand labor and to render all processes as nearly automatic as possible. Adjunct to this end are the constant changes in the quality of metals, the perfecting of lubricants, and the simplification of forms by which the materials of construction are better utilized.

Relation of Manufactures to Social Life.—Much that has been the subject of anxiety since the great growth of manufactures and the development of the factory system is now becoming less threatening, and in many cases altogether satisfactory as to the social effect of manufactures. In most American cities the diversity of occupations offered, and the readiness with which good wages are obtained, have constituted a condition of ease and security not known in cities not manufacturing. In Philadelphia, particularly, there are no crowded mills filled with work people competing for poorly-paid labor. The family of the workman has its own residence, and the wages of the two or three members usually able to take regular employment are ample for its maintenance. At least half these families own the dwellings they occupy, and it is usual to seek occupation in different pursuits for its different members. The wages paid will average $480 to men, and $250 to women or youths, annually, the average receipts of a family being $500 to $700 during the year at the lowest, and often $1200 where more than two members can engage at steady work. The aggregate paid as wages is enormous in the greater cities, New York city being reported to have paid $97,030,021 as wages by the census of 1880, and Philadelphia, $83,965,518, by the municipal census for the year 1882. In no possible way other than this could so much of money and resources go directly to the people employed at labor, and the prosperity secured by these manufactures has had no equal in former periods, or in distinctively commercial cities. The profits of these city industries are chiefly retained within the circle of business and social life of each city, and they accumulate at the rate of 10 to 15 per centum of the annual product, one-half of which is put in new buildings, machinery, and permanent improvements. The surplus is not misdirected or removed in most cases, and it takes the best forms of realized wealth, and forms a reserve that would not be exhausted for a considerable period, if the earnings both of the proprietors and those who work for wages should cease for a time.

The Capital Employed in Manufactures.—It may be safely assumed that four-fifths of the capital now employed in manufactures is the accumulation of those who conduct them, as proprietors, and has not been drawn or taken from other pursuits. As usually stated, the capital needed in each establishment is about two-thirds of the value of its product yearly, half of which capital must be in cash, or its equivalent. Yet in many cases the proprietor begins and conducts a business with less, and by skilful management turns his products twice or three times yearly. This is a very profitable method, yet it has great risks, and not infrequently results in a failure of the immediate managers, and a transfer of the plant in machinery and buildings, wholly or in part, to other hands. The present employment of active capital in money or solvent credits in manufactures is very large in the United States, being given in the census of 1880 as $2,790,272,606, and yielding a product valued at $5,369,579,191. The increase on both these items in the five years since elapsing will exceed 5 per cent. per annum, this period having been the most active and successful in business, and having been marked by a considerable diversion of capital from other pursuits to manufactures. (L. B.)

MANURES. See under AGRICULTURE, AMERICAN, Vol. I., p. 97, and FERTILIZERS.

See Vol. XV. p. 531 Am. ed. (p. 523 Edin. ed.).

MAPLE. On the American continent the dwarf-maple of the Rocky Mountains, *Acer glabrum*, and the vine-maple, *Acer circinatum*, of the northern part of the Pacific coast, most nearly resemble the field-maple of Europe in habit and economic uses. The latter makes bow-wood for the northwestern Indians, and, instead of a small tree frequently forms almost impenetrable thickets of underbrush in the forests. The edges of the leaves turn to a bright crimson in autumn, and give a beautiful character to the rural scenery. From Western Montana, south, the only maple is another dwarf species, *Acer grandidentata*. *Acer macrophyllum*, the Oregon sycamore, is the only species on the Pacific coast worthy of the name of maple tree. It has been known to reach 100 feet, but its general height is about 50 feet. In California the leaves and stems are green, northwardly, reddish, and the whole character more nearly approaching the sycamore maple of Europe. It is confined chiefly to bottom lands, reaching, however, altitudes of 3000 or 4000 feet alongside of streams. It rarely reaches a circumference of 6 feet. The timber is whitish and beautifully veined, and, like all of the genus, makes admirable furniture, especially when found in the curled and contorted condition for which the wood of all the genus is famous. *Acer* (*negundo*) *californicum* is the box-elder of California, a low red-twigged, hairy-leaved form, of little use in the arts. The eastern box-elder, *Acer negundo*, or *Negundo aceroides* of some authors, presses close on towards the Pacific States, growing chiefly in low alluvial bottoms, and is one of the most valuable of timber trees for sections where such trees are rare. It grows with great rapidity, though it seldom reaches a greater height than 50 feet. The wood has a beautiful creamy-white tint. Sugar is made from the sap, and though it is generally believed to be inferior in productiveness to the *Acer saccharinum*, Dr. Vasey, United States Botanist, in a report to the government in 1872, thinks this may not be its character under all circumstances. He tested a five-year-old tree, measuring 3½ inches in diameter, and found it gave a half gallon of sap per day, with the high percentage of 2.8 of sugar, whiter than that from the popular sugar maple. The shoots of the western form of this tree are of a bluish tint, and it is erroneously called in European forestry the California box-elder, and is preferred for its lumber. The eastern form has greenish shoots, and is generally known as ash-leaved maple. Trees are often unisexual, and therefore females produce samarras. Under these circumstances the seeds are wholly wanting.

The red maple, *Acer rubrum*, is famous for its curled wood, used for gun-stocks, and other articles. The species is interesting to botanists by showing that the laws of nature in the production of sexes in flowers may operate differently at various stages of development. In this the andrœcium and gynœcium seem to develop together equally until the anthers are fully formed. At this stage either the stamen continues to grow by the elongation of the filaments, in which case the gynœcium ceases to advance further, and the anthers become abundantly polleniferous, or the anther after being fully formed ceases to grow and becomes sterile, while the gynœcium advances to perfection, and the perfect pistils receive pollen by the wind from foreign flowers. Each tree is therefore either wholly male, or wholly female, in spite of the apparent hermaphrodism of the flowers in their early stages. From these facts the tree has received marked attention from American biologists. Though naturally found in swampy places, it has been discovered that this is because the seeds germinate best in damp situations, while the tree makes its best growth on drier ground, often in these cases reaching 80 feet high and of proportionate diameter. Its sugar-production is about one-half that of the regular sugar-maple, but the bark is rich in tannin. The red-maple forms the chief post plant for the mistletoe in Southern New Jersey and Delaware. It has a wider range over the American continent than any other species, being found in Florida and Texas, and in N. lat. 49° on the Atlantic, and it has been collected on the Pacific by the writer of this, in Alaska, near the mouth of the Chilkat River, between 59° and 60° N. lat.

The soft- or silver-maple, *Acer dasycarpum*, is found as far north as New Brunswick, extends south to Florida, and is found west as far as Eastern Dakota and Nebraska, chiefly along river bottoms and in low grounds. It is remarkable among maples in perfecting its seeds within a few weeks after the development of the leaves; and these sprout immediately on falling, making young trees often 1 or 2 feet high the same season. The seeds maintain vital powers for a few weeks only. Its rapid growth when young, and the ease with which the plants are raised, have brought it into common use as a street tree, for which, however, it is inferior to the Norway, sycamore, or sugar-maple. The wood is light, hard, and strong, in common use for pegs, tooth-picks, light furniture, and it makes good fuel. The tree grows usually to a height of 50 feet, and its trunk is about 9 feet in circumference. It yields some sugar.

The best known species is the sugar-maple, *Acer saccharinum*. Its geographical range is similar to that of the last; but it is vastly more abundant, in the North-eastern States, together with the beech often forming the forest growth exclusively. Its sugar-making properties were known to the Indians. The Ottawa Indians made sugar-gathering a festive occasion. The first product from an early tree was sacrificed by the medicine man to the great spirit. The women made the wooden troughs, and tapped the trees about two feet from the ground. The men built the fires and hung the kettles for the sap to boil, and the women did the rest of the work. The sugar was finally packed in "mocucks" for shipment. Groves of sugar maples have been found more profitable to some eastern farmers than their best farm land. The extraction of the sap does not seem to injure the trees. They yield for many years. The season lasts sometimes from October to May, but the flow is according to the weather. The change from starch to sugar is believed to be due to a ferment fungus. Tubes are usually made of sumac or elder. They are not inserted more than half an inch within the wood. As many as 20 tubes have been placed in one tree, yielding in one day 23 gallons and 3 quarts of sap, from which 7¼ lbs. of sugar were obtained. The quantity of sugar from sap varies. As much as 23 lbs. have been obtained from 100 gallons of sap. Frost seems essential to the formation of sugar. South of Virginia the tree has never been known to yield sugar (Dr. Peyre Porcher). Canada produces a large quantity, but exports little. The quantities made increase every year. In 1842–43 the product was 3,699,859 lbs. It had increased in 1852–53 to 8,731,510; in 1860–61, to 16,774,313; in 1870–71, to 17,276,054. But the average exports rarely exceed 1000 lbs. a year. The heaviest ever recorded was in 1873, when it reached 39,428 lbs. The largest sugar-producing States are Indiana, Michigan, New Hampshire, New York, Ohio, Pennsylvania, and Vermont. The total product in the United States in one year has reached 35,105,705 lbs. In Vermont, the product at 10 cts. per lb. in one year has been valued at $901,453, exclusive of syrup valued at $1 per gallon.

Sugar maple sap exposed to the sun for four days yields excellent vinegar. Ammonia is found in the sap till the flowers open, when it disappears. The bark, together with sweet gum and copperas added, yields a purple dye; mixed with red-oak and copperas the dye is dove color; with black walnut, it is brown. The weight of sugar maple lumber is one-half more than linden. The timber makes superior saddle-trees. The average height of the tree is 80 feet, the habit more erect than other maples. A borer, *Ægeria acerina*, is often very destructive to the trees. The tree has been introduced into France for sugar-making purposes, and a yield of 1 lb. of sugar from small trees reported. A variety (or species) *Acer nigrum*, grows with the other in the west. The leaves have the same tint of green on both sides, while that of the common sugar is paler beneath. The leaves have blunter lobes, and the margins are deflexed. The upper tint is darker than the common form, hence the specific name. It is known from this fact as the black sugar maple. Its general properties and value are about as the last. A singular anomaly in the sugar maple is that of the two samarras, one is almost always hollow. The numerous species of Asia are useful as ornamental plants, but have so far developed no economic value in America. (T. M.)

MARBLE, American. The area of the United States is abundantly supplied with marble, which in several localities is of fine texture and pure white color, though there has been none as yet quarried which equals the finer statuary marble of Europe. Colored marbles of great beauty exist in various regions. In the Eastern United States the finest examples of marble are the blue and white varieties so extensively quarried at Sutherland Falls and Rutland, Vt. The white marble from Rutland is suitable for statuary work. Passing south and west from this locality the white crystalline marble varies greatly in texture, growing coarser and less valuable. Of colored marbles Northern Vermont yields some very beautiful examples, while Thomaston, in Maine, and Central New York possess quarries of a fine gray-tinted stone. Probably the most beautiful of American colored marbles are those of Eastern Tennessee, which are now quite extensively used in America for ornamental purposes. They have been employed for decorative work in some of the most important buildings of the country, including the capitol at Washington. This stone is claimed to be softer and more easily dressed than the colored marbles of the Lake Champlain region. In the western section of the country are extensive quarries of good building marble, Ohio, Illinois, and Iowa yielding large quantities annually. Further west fine

See Vol. XV. p. 535 Am. ed. (p. 528 Edin. ed.).

marbles occur in many localities, though as yet very little has been quarried. Colorado possesses several varieties of marble of excellent quality. The same may be said of Montana. Marble is abundant in the Pacific States, though much more so in California than elsewhere. Much of the California marble is of excellent quality, pure white or beautifully variegated, and susceptible of the highest polish. In the quarries now worked on the McCloud River, near Copper City, there is an extensive deposit of pure white marble, fit for all kinds of delicate work, even for statuary. As yet none has been found equal to the Carrara statuary marble, yet it may prove so when quarried deeper. The value of much marble, in America as elsewhere, is vitiated by impurities, which are of frequent occurrence. Thus many of the marbles of Pennsylvania contain talc and mica. A beautiful rose-red marble, at Danville, N. J., contains an abundance of black mica. The marble of a quarry near Chicago contains petroleum—not visible when quarried, but showing itself on exposure, and discoloring the stone.

In 1880 there were 616 quarries opened in the United States for the production of marble and limestone for building purposes. The quantity mined was 65,523,965 cubic feet, worth $6,856,681. Of this product more than one-half (nearly 35,000,000 cubic feet), came from Ohio, Illinois, and Iowa, in nearly equal proportions. Vermont yielded 1,192,100 cubic feet. Yet in value of product it surpassed any other State, its marble being valued at $1,340,050, or fully ten times the average value per cubic foot of the total product. The importation of marble into the United States in 1884 was of the value of $592,057. This was nearly all in the unworked state, in rough or squared blocks. In addition to the use of marble for building purposes about 25,000 tons are ground into dust annually, and used to generate carbonic acid gas in soda fountains, etc. This dust is worth $7.00 per ton. It is made principally from the scrap marble of the New England and New York quarries. (C. M.)

MARBLEHEAD, a town and port-of-entry of Massachusetts, in Essex county, 18 miles N. E. of Boston. Branches of the Eastern Railroad extend to Salem and Swampscott. It stands on a rocky headland, at the N. end of which is a deep and secure port. The principal part of the village is on the W. side of the harbor, the detached part on the E. side being known as Nashua Village. Marblehead has 8 churches, 2 national banks, a weekly and a monthly newspaper, and is an important seat of the shoe trade, children's shoes being the kind chiefly made here. The garden-seed and market-garden business is also carried on. Many coasting-vessels are owned here, yet the town has little commerce, and the fishing interests, once important, have declined. Marblehead is an attractive summer resort. Population in 1880, 7467.

MARCH, Francis Andrew, an American philologist, was born at Millbury, Mass., Oct. 25, 1825. He graduated at Amherst College in 1845, and was tutor there 1847–49. He was admitted to the bar at New York in 1850, but still engaged in teaching. In 1855 he was appointed tutor in Lafayette College, Easton, Pa., in 1856 adjunct professor, and in 1858 professor of the English language and comparative philology. He has taken high rank as an Anglo-Saxon scholar, and in 1873 was elected president of the American Philological Association. He has contributed to the *Princeton Review* and to the *Transactions* of learned societies. Among his publications are *A Method of Philological Study of the English Language* (1865); *An Anglo-Saxon Grammar* (1870) and other text-books; *Latin Hymns* (1872), and part of Eusebius (1874).

MARCOU, Jules, a French geologist, was born at Salino, Jura, April 20, 1824. He was educated at the Collége St. Louis in Paris, and after attending Thurmann in his geological labors in the Jura received instruction from Agassiz. In 1847 he was employed in the palæontological department of the Sorbonne, and for it he made extensive geological investigations in Europe and from 1848 to 1850 in Canada and the United States. In the service of the United States he explored the Rocky Mountains in 1853–54, and again in 1860. He was appointed professor of palæontology at Zurich in 1855. He published in English a *Geological Map of the United States* (1854), which was followed by *Geology of North America* (1855). He also published *Le Terrain carbonifère dans l' Amerique du Nord* (1855); *Drias et trias* (1859); *De la Science en France* (1869); *Carte géologique de la terre* (1862; 2d ed., 1875).

MARCY, Randolph Barnes, an American general, was born at Greenwich, Mass., April 9, 1812. He graduated at West Point in 1832 and entered the infantry. In May, 1846, he was engaged in the first battles of the Mexican war, and afterwards explored the Red River. He served in the Utah expedition in 1857–58, and in 1859 he became paymaster. Soon after the outbreak of the civil war he was made chief-of-staff to Gen. McClellan, his son-in-law, and served with him in West Virginia, on the Peninsula, and in the Maryland campaign. He was appointed brigadier-general of volunteers Sept. 23, 1861. He was brevetted major-general in 1865, became inspector-general in 1878, and was retired in 1881. He published *Explorations of the Red River in* 1852 (1853); *Prairie Traveller* (1859); *Personal Recollections* (1866).

MARCY, William Learned (1786–1857), an American statesman, was born at Southbridge, Mass., Dec. 12, 1786. He graduated at Brown University in 1808, taught school at Newport, R. I., and became a lawyer at Troy, N. Y. In 1812 he was an officer of volunteers and captured at St. Regis the first prisoners and the first flag taken on land in the war. In 1816 he was appointed recorder of Troy, and in 1818 began to edit the *Troy Budget*, which he made a leading Democratic organ. He was adjutant-general of New York in 1821, comptroller in 1823, judge of the State Supreme Court in 1829. He was chosen U. S. Senator in 1831, but resigned in 1832 on being elected governor of New York. He was twice re-elected to this position, but in 1838 was defeated by W. H. Seward. In 1839 Pres. Van Buren appointed him one of the commissioners to decide on the Mexican claims, and he was thus employed until 1842. There had been serious trouble and open division in the Democratic party in the State of New York for years, growing out of the pro-slavery policy steadily forced upon the party by its Southern leaders. Marcy, having shown himself sufficiently complaisant to Southern demands, was made secretary of war by Pres. Polk in 1845, and thus had charge of the arrangements of the Mexican war. When Pierce, who belonged to the same wing of the party, became President in 1849, Marcy was retained in the cabinet as secretary of state. He followed in the footsteps of Daniel Webster in maintaining a bold and self-reliant tone in controversies with European governments. Retiring from office in March, 1857, he died suddenly at Ballston Spa, N. Y., July 4, 1857.

MAREY, Étienne Jules, a French physiologist, was born at Beaune, March 5, 1830. He studied medicine at Paris, obtaining his degree in 1859. He devoted himself to physiological research and founded a laboratory for the purpose. In 1869 he was made professor of natural history in the Collége de France, and he succeeded Claude Bernard in the Academy of Sciences Dec. 2, 1878. Dr. Marey has invented many instruments for recording the movements of the heart, lungs, arteries, muscles, and other parts of the human body, the flight of birds and insects, etc. His publications comprise *Physiologie médicale de la circulation du sang* (1863); *Du Mouvement dans les fonctions de la vie* (1868); *La Machine animale, locomotion terrestre et aérienne* (1874), of which an English translation has appeared in New York (1874); *Physiologie expéri-*

mentale (1875); *La Méthode graphique dans les Sciences expérimentales* (1878).

MARGRY, Pierre, a French historian, was born at Paris, Dec. 8, 1818. He entered the department of the marine and became joint-keeper of the archives. In 1842 he was commissioned to make historical researches regarding French expeditions to America, and the result has appeared in a series of volumes. Among these are *Les Indiens renards* (1854); *La Navigation du Mississipi* (1859); *Les Normands dans les vallées de l' Ohio et du Mississipi* (1860); *Mémoires sur les découvertes et les établissements des Français* (1879). Dr. Margry has also published *Les Navigateurs Français et la Révolution Maritime du XIVe au XVIe siècle* (1867), and other works relating to French explorers, as well as an autobiographical volume, entitled *Les Souvenirs d'un homme de lettres* (1877).

MARIA CHRISTINA (1806–1878), queen of Spain (1829–33), was born at Naples April 27, 1806. She was the second daughter of Francis I., king of Naples, by his second wife, Maria Isabella, Infanta of Spain. She became the fourth wife of King Ferdinand VII., Dec. 11, 1829. The king was then childless, and the Carlists had expected that his brother, Don Carlos, would succeed to the throne. To their consternation the decree of March 19, 1830, declared the crown heritable in the female line. The queen bore two daughters, Maria Isabella Louisa, since known as Isabella II., born Oct. 10, 1830, and Maria Louisa Fernanda, born Jan. 30, 1832, who was married to Antoine, Duke of Montpensier, youngest son of Louis Philippe. In October, 1832, the king appointed Maria Christina regent, and, though he afterwards resumed the government, he repeated the appointment in his will. Ferdinand died Sept. 29, 1833, and Christina assumed the regency, but, having fallen in love with Muñoz, a soldier of the royal guard, was married to him Dec. 28, 1833. This relation and her French policy produced ill-will among the nobility. In August, 1836, she was compelled by a body of soldiers to accept the constitution of 1812 until a new constitution should be prepared. This was done in June, 1837, but her strong desire for centralization remained, and in June, 1840, she abolished the municipal liberties of Spain. When a general insurrection broke out in consequence, she abdicated in favor of Marshal Espartero as regent and retired to Paris. Isabella was declared to have attained her majority Nov. 8, 1843, and in 1844 Christina returned to Madrid and publicly celebrated her marriage with Muñoz, now made Duke of Rianzares. Christina still took part in public affairs, and in 1854 she was again driven from Spain. Retiring to France, she resided at Malmaison until 1861, when she removed to Paris. From September, 1864, she resided in Madrid for four years, and was then driven out in company with her daughter Isabella. Henceforth she resided in turn at Paris, Rome, Florence, etc. She died at Ste. Adresse, near Havre, Aug. 23, 1878.

MARIETTA, a city of Ohio, county-seat of Washington county, is on the Ohio River at the mouth of the Muskingum, 200 miles E. by N. of Cincinnati. Railways connect it with Cincinnati and with Cleveland. It is the oldest town in Ohio, having been settled in 1788 by Gen. Rufus Putnam. Here are the remains of pre-historic mounds and earthworks of remarkable extent. (See Squier and Davis' *Ancient Monuments of the Mississippi Valley.*) The town stands in a picturesque region, and is the chief market of a fertile country, rich in coal, petroleum, and iron. Marietta College (founded in 1835) is a prosperous non-sectarian institution with handsome buildings and a good library. Marietta has several churches, newspapers, and schools, and carries on thriving manufactures of wooden and hollow wares, leather, flour, furniture, stoves, etc. Petroleum and its products, produced in the vicinity, form a staple element in the trade of the town. Population in 1880, 5444.

See Vol. XV. p. 551 Am. ed. (p. 544 Edin. ed.).

MARIGOLD. Several plants are known under this name. That of Fig-marigold is applied to members of the genus *Mesembryanthemum.* The Corn-marigold is *Chrysanthemum segetum*—very popular at this period with florists for winter forcing. *Caltha palustris* is the Marsh-marigold. The species of *Tagetes* furnish the "French" and "African" marigolds, because the plants were improved by the French, the plants themselves being natives chiefly of Mexico. The marigold, pre-eminently and without qualification, though sometimes called garden or pot marigold, is a species of *Calendula*, native of the south of Europe, though from time immemorial cultivated in gardens. *Calendula officinalis*, the common garden marigold, is the plant of classic writers, and the name *Caltha* is also associated with it. On the reconstruction of botany in modern times Caltha was limited to the family which now bears the name. The derivation of the name marigold is uncertain. Dr. Prior says, "called in the Grete Herball *Mary Gowles*, a name that seems to have originated from the Anglo-Saxon *merse-mear-gealla*, marsh-horse-gowl—the marsh-marigold or caltha—transferred to the exotic plant of our gardens (*calendula*), and misunderstood as marygold."

The garden marigold has some flowers open continually from early spring to winter, and "all winter, if it be mild" says an English author, and from this keeping step with the calendar received, it is said, the name *Calendula.* The flowers were at one time a favorite ingredient in soups. One of the earliest recorded sports among flowers is of a marigold, which is figured by Gerarde. Numerous small flowers on short stalks curve out from under the terminal one like the wires of an inverted umbrella. Linnæus in noting his floral clocks placed from nine to three as the time in Sweden for the marigold to keep its flowers fully open. The marsh-marigold *Caltha palustris*, grows all over the north of Europe, and Eastern North America. It is cooked as greens in Massachusetts, where it is sometimes erroneously called cowslip. The fig-marigolds are chiefly natives of the south of Africa; two or three species are found in California. One *Mesembryanthemum edule* produces a pleasantly acid fruit, known as the Hottentot-fig from its form. In Australia the fruit of some kinds are known as "pig-faces." Some of the species are cooked and eaten. The plants are rich in potash. The whole order of *Mesembryanthaceæ* are commonly known as the order of Fig-marigolds or Fig-worts. The well-known ice-plants, of which there are several species, are fig-marigolds. (T. M.)

MARINE HOSPITAL SERVICE, U. S. This Service, established in 1798, is the medical bureau of the treasury department, and is charged with the duty of providing relief for the sick and disabled seamen and employés of the U. S. merchant marine, its primary object being to encourage fit persons to become merchant seamen by making provision for their care and maintenance when sick or disabled, and also to relieve municipalities of the burden of providing for a class who are for the most part impecunious and have no home except upon the water. It is under the immediate direction of a supervising surgeon-general, who is appointed by the President by and with the advice and consent of the Senate, who is responsible to the secretary of the treasury for all his official acts, and is required by law to "supervise all matters connected with the Marine Hospital Service."

In 1730 George III. sent "instructions to Patrick Gorden, Esq., Deputy Governor of the Province of Pennsylvania, authorizing him to deduct the sum of six pence per month from the wages of all seamen, English subjects, sailing in and out of American ports." This money was to be used in caring for these seamen when sick or disabled, and was known as "hospital money." Gorden appointed four receivers in Pennsylvania for this purpose, two for Philadelphia and one each for New Castle and Lewes. In 1780 the Commonwealth of Virginia enacted a law requiring the deduction of nine pence per month from the wages of seamen and mariners in that State as "hospital money," and authorized naval officers to collect the tax, allowing a commission of 5 per cent. for the same. In 1782 this tax was increased to a shilling per month, and in 1789 a hospital was authorized to be built and the governor was directed to appoint a commission to select a site for the same in the town of Washington, county of Norfolk, Va. In 1789 North Carolina's legislature enacted a law creating a "hospital fund," and the commissioners-of-the-poor were authorized to collect a per capita tax, for captains, 5*s.*; mates, 2*s.* 5*d.*; and each member of the crew, 1*s.* 6*d.* These efforts, it will be seen, were not national, each State acting independently in caring for its own merchant seamen. The necessity for the general government to take the matter in hand and provide for the relief of sick and disabled seamen at the various ports was presented to Congress in 1789, but a bill for that purpose received little encouragement. In October, 1790, the Boston Marine Society appointed a committee to consider the most desirable place for erecting a marine hospital and its expense, and to calculate the annual income arising from a small tax on the wages of seamen for its support. The following month the committee reported in favor of locating the hospital on the heights east of Charlestown. The committee was then "further instructed to draw up a petition to Congress setting forth the utility of a marine hospital and pointing out the means of supporting it." In 1791 the petition was approved by the society and forwarded to Congress. It prayed for the establishment of three hospitals in the United States for the care and support of aged and disabled seamen—one each for the Southern, Middle, and Eastern States. The petition was promptly tabled but was afterwards referred to the secretary of the treasury. In the meantime the Commonwealth of Virginia had passed an act authorizing the sale to the United States of the Marine Hospital at Washington, Va., and the House Journal of 1792 shows that a letter from the secretary of the treasury concerning the marine hospital at Washington, Va., and the petition of the Boston Marine Society were read and referred to a committee whose report when presented was also promptly tabled. However, in November following, another congressional committee was appointed "to prepare and bring in a bill for the relief of sick and infirm seamen," and the report of the former committee, together with the letter of the secretary of the treasury of the previous session, was referred to this committee. A bill was reported on January 21, 1793, read and committed to committee of the whole house, but no further action was taken upon it. In 1794 an act was passed providing for the relief of sick and destitute seamen in foreign ports, and two agents were appointed, one to reside in Great Britain and the other in the West Indies. In 1797 a committee was appointed to inquire into the operations of this act, and reported that "numbers of seamen, foreigners as well as natives, arrive at the different ports of the United States in such a disabled situation that they either become a great burden to the public hospitals (where any such are established) or are left to perish for want of proper attention. They are of opinion that a sufficient fund might be raised for the support and relief of sick and disabled American seamen as well in foreign ports as in the United States, either by an additional tonnage duty on all vessels entering the ports of the United States or by a charge on the wages of all seamen shipped within the United States, proportioned to the length of voyage, to be paid or secured by the master and deducted from the wages of the crew." In addition to this report the committee presented the following resolution and recommended its passage: "*Resolved*, That provision ought to be made by law for collecting the sum of — cents per month from the wages of every seaman sailing from any port in the United States, to be appropriated: 1. To the temporary support and relief of sick or disabled seamen of the United States; 2. To the foundation of hospitals for the relief of such sick and disabled seamen (when a sufficient fund shall be collected)." On July 16, 1798, an act was passed providing for the collection of 20 cents per month from the wages of each seaman employed on merchant vessels of the United States while so employed, and authorizing the President to receive donations of land or buildings, erect hospitals when necessary, and appoint directors of marine hospitals to expend the fund assigned to each port. In 1799 an additional act was passed authorizing the expending in each State the moneys collected therein, except the States of New Hampshire, Massachusetts, Rhode Island, and Connecticut. It also authorized the secretary of the navy to deduct 20 cents per month from the pay of officers, seamen, and marines of the navy, thereby including them as beneficiaries of the fund the same as seamen of the merchant marine.

The States above excepted doubtless contributed to the support and enjoyed the privileges of the Charlestown Marine Hospital near Boston. Up to 1802 marine hospitals were established at Boston (Charlestown), Newport (shortly afterwards abandoned), Norfolk (the Washington hospital purchased from Virginia in 1801), and Charleston, S. C. Relief stations were established in addition at Baltimore, Philadelphia, and New York, where patients were sent to municipal hospitals, and their care and treatment paid for out of the fund at so much per week; and at Portland, Me., New London, Conn., Wilmington, New Berne, and Edenton, N. C., and Alexandria, Va., they were cared for at private houses at the expense of the fund, which amounted at that time to $141,690.25, including $15,635.33 received from the navy department. The expenditures up to this time amounted to $74,936.51, including $6183.33 expended for the purchase of the Washington hospital for relief at Norfolk. Up to this time the fund was not a general fund—only the amount collected in a district could be expended in that district. Much complaint resulted from this state of things as seamen would frequently be taken sick in districts where they had paid no dues or where there was no money to provide relief for them, and they would thus receive no benefit from the dues paid elsewhere, so an act was passed in 1802 making the fund general in its application, and also extending relief to American seamen in the port of New Orleans, then under Spanish rule, as many of our seamen were found to be suffering there owing to the increasing traffic between that city and the United States. About this time a new hospital building was contracted for at Boston to be built upon ground lately purchased for a navy-yard, and in 1804 temporary provision was made for sick seamen at New Haven, Conn., Wilmington, Del., and Providence, R. I. Much difficulty was experienced in making the fund cover the expenses of the service, and it was found necessary to limit the relief furnished, and to exclude chronic cases and maniacs from its benefits. In 1809 the secretary of the treasury recommended an appropriation by Congress to cover the deficiency, as the fund was totally inadequate.

In 1811 the secretary of the navy urged the separation of the fund arising from the tax on merchant-seamen from the tax on officers and seamen of the navy, thus making a separate fund for each, he stating that little or no benefit accrued in proportion to the amount collected from the navy; this was done, and the two funds have remained distinct ever since.

The inadequacy of the fund became greater each year and effort was made to increase the tax; memorials to Congress were frequent and urgent, and suggestions of various kinds for the relief of the sick and disabled seamen were sent in from all parts of the country stating that unless something was done for the sufferers their neglect would prove disastrous to commerce, etc. Congress, however, did nothing until 1813, when $20,000 was appropriated. In 1818 the Boston hospital was partially destroyed by fire, and a new one was commenced in 1825 and occupied two years later. In 1834 an effort was made to establish a hospital at Portland, Me., but without success, and two years later the physicians of Portland forwarded a memorial praying Congress in behalf of a hospital at that port with no better success.

The secretary of the treasury again reported to Congress the inadequacy of the fund, and in 1837 the collection of dues was suspended for one year, and Congress appropriated $150,000 in lieu thereof, also $7000 for establishment of a hospital at New Orleans, $10,000 for one at Mobile, and $15,000 for three sites on the Mississippi River and Lake Erie, the latter in response to numerous petitions from the West. In 1842–43 a hospital building was begun at Ocracoke, N. C., but not occupied till 1847, and then only for a brief season, when it was abandoned as not necessary. An act authorizing the secretary of war to appoint three medical officers to select sites for hospitals on the western waters was passed in 1842. This board recommended Cleveland, Wheeling, Louisville, Paducah, Napoleon, Natchez, and St. Louis. Considerable rivalry was manifested by Pittsburg against Wheeling, and another board recommended the former place, which eventually secured the hospital. Not until 1844 were titles perfected, and then only Cleveland, Pittsburg, and Louisville were satisfactory. A hospital was also commenced at Key West in 1844, to be used as a quarantine for yellow-fever patients as well as a marine hospital. In 1849 a committee was authorized to make a report on the marine hospital service and the condition of the fund; a thorough inspection of the hospitals was made by this committee, composed of Dr. George B. Loring, of Boston, and Dr. T. O. Edwards, of Lancaster, Ohio. They recommended the sale of the Chelsea hospital at Boston and a more adequate one to be built in its place; the abandonment of hospitals at Ocracoke and Napoleon, and establishment of one at Wilmington, N. C.; expressed doubts of the necessity for a hospital at Paducah, Ky., and were of the opinion that in addition to the one established at New Orleans the establishment of another at Natchez, and at St. Louis, would be sufficient for the Mississippi River towns. They also recommended that hospitals be built at Detroit, Buffalo, and Cincinnati, and at one or more ports in Maine. At this early day a surgeon-general for the service, which had no medical head, is foreshadowed in the report of this committee, which states that "No method of government and internal regulation has been entered upon which would render them parts of a uniform whole," and recommends "a chief surgeon who shall have his bureau attached to the treasury department, and the regulations which are to govern the hospitals should emanate from him," etc.

In 1850 the secretary of the treasury was directed to inquire into the necessity for and terms upon which sites for marine hospitals could be obtained at Newport, Erie, Pa., Buffalo, Oswego, Detroit, Wilmington, N. C., Galveston, and Appalachicola. He reported that, while desirable to have hospitals at all these places, the state of the fund, the claims of other districts, and the dependence upon Congress for appropriations to meet the increased expenses deterred him from making any recommendations. Subsequent secretaries of the treasury, up to the beginning of the war of the rebellion, all reported the inadequacy of the fund and the necessity for reorganization on some other basis, and annual appropriations were made by Congress for defraying the expenses of the service, ranging from $97,000 in 1841 up to $275,000 in 1860.

During the continuance of the war, the marine hospitals (26 in all) were occupied for the most part by the sick and wounded of the armies of the North or South, according to location, and annual appropriations, ranging from $175,000 to $200,000, were made by Congress to support those in the loyal States. After the close of the war further inspections of the marine hospitals were made, several were discontinued, and various recommendations made for improving the service. Finally, in 1870, an act was passed reorganizing the service, increasing the tax on seamen to 40 cents per month, and authorizing the secretary of the treasury to appoint a supervising surgeon to supervise all matters connected with the Marine Hospital Service. Dr. John M. Woodworth, of Illinois, was appointed to this office in March, 1871, and at once entered upon his duties. He issued new regulations governing its management, provided for the organization of a corps of medical officers, and soon brought order out of chaos; so that, in less than five years, the service, which had required annual appropriations for the past thirty-three years, was now almost self-supporting, and possessed a responsible head with an educated corps of medical officers. From 1798 to 1873 appointments of medical officers were made without preliminary examination as to their professional qualifications, but since the latter date examinations have been made by a board of medical officers of the service appointed for that purpose, and successful applicants are eligible to appointment as assistant surgeon, are in line of promotion to passed assistant and to surgeon, and all officers are subject to change of station. In 1875 the name of supervising surgeon was by act of Congress changed to supervising surgeon-general, and the appointment made a Presidential one. In the same year an act was passed providing for the preparation of a schedule for the collection of hospital dues based upon rig, tonnage, and kind of traffic of vessels, but this was found to be impracticable at that time, and abandoned.

In 1878 a quarantine act was passed, placing the management of national quarantine under the surgeon-general; but in the following year Dr. Woodworth died, and pending the appointment and confirmation of his successor another act was passed taking its management out of the service for four years. Dr. John B. Hamilton, of Illinois, was made surgeon-general by promotion from the corps, and continued the work of his predecessor, the service requiring no appropriation by Congress up to June, 1884, when the tax on seamen was abolished and the pre-existing tonnage tax, somewhat modified, substituted, which is now supplemented by small annual appropriations.

The duties devolving upon the officers of the service have gradually increased, until now they have, besides the care of seamen of the merchant marine, the management of national quarantine, examination of U. S. merchant marine pilots for color-blindness, examination of officers and men of the U. S. revenue cutter service as to physical condition, examination of cadets of that service as to their fitness for appointment, physical examination of surfmen of the life-saving service as to their ability to perform the duties assigned them, and the physical examination of officers and crew of any U. S. merchant vessel whose master or owner desires such examination.

Ever since the reorganization of the service in 1871, the surgeon-general has made annual reports to the secretary of the treasury, which are full of valuable medical and surgical information, and are much sought after by professional men. They contain a detailed statement of the operations of the service, with contributions from its officers of interesting cases of disease and injury, articles on hospital construction, quarantine, hygiene, and kindred subjects. The annual report for 1885 shows that relief was furnished at 210 stations, and that 41,724 sick and disabled seamen were cared for during the year at a total cost of $436,443.91, of whom 28,921 were office patients, receiving 43,793 days' relief, and 12,803 were admitted to hospital, receiving 318,408 days' relief. The receipts from tonnage tax amounted to $387,852.59, leaving a small deficiency which was met by an appropriation by Congress. The expense per capita was $10.45, while in 1870, just previous to the reorganization of the service, it was $38.41.

The medical corps of the service consists of a supervising surgeon-general, surgeons (one of whom is detailed as medical purveyor), passed assistant surgeons, and assistant surgeons; the latter are eligible for promotion after three years' service in hospital and passing a successful professional examination. Hospital stewards are assigned to duty at the marine hospitals and larger stations, and are graded into three classes, according to efficiency. In addition to the regular corps of medical officers, there are a number of acting assistant surgeons who, for the most part, are on duty at stations where there are no marine hospitals, and where but few seamen apply for relief—they are local appointees, and not subject to change of station. (P. H. B.)

MARL, a clay which contains a large proportion of carbonate of lime, sometimes to the extent of 40 or 50 per cent. If composed largely of shells, or shell fragments, it is called shell-marl. It is largely used as a fertilizing material, and the name of marl has been popularly given to certain other beds of clay or sand which are useful for the same purpose. Such are the green sands of New Jersey, whose value is due to a green silicate of iron and potash which forms its bulk, sometimes to the extent of 90 per cent. Some phosphate of lime is also present. Marl is found in almost every country, it being due to marine or fresh-water deposits in mud or sand of the calcareous shells of mollusks and other animals. It has been used as a fertilizer in Europe since the Roman period, and is now much used in France and Germany. The marls of the United States belong to the cretaceous and tertiary, and the recent geological formations. The first of these are green sand and marine calcareous marls. The second add to these phosphatic and argillaceous marls. The recent marls are fresh-water calcareous deposits. The cretaceous and tertiary formations occur in great deposits from the upper New Jersey coast throughout nearly all the Atlantic and Gulf States to Texas. They are also found in Arkansas and Tennessee. Recent marls are found, in small deposits, in the New England States. Enormous deposits exist in Central New York and along the valley of the Hudson. Extensive beds are found in Ohio, and small ones in some other States.

Of these marls the only ones that are used industrially to any important extent, are those of New Jersey. Here the green-sand bed is 90 miles long and from 6 to 10 miles in width. It is extensively used as a fertilizer, some of the New Jersey farmers using from 1000 to 5000 tons each season. Its use is, however, decreasing, the artificial commercial fertilizers taking its place. In 1882, 1,080,000 tons were consumed; in 1883, 972,000; and in 1884, 875,000, at a rough estimate. This is sold at an average price of 50 cents per ton at the pits.

The value of marl to the fields is largely mechanical. Where the lime is greatly in excess it acts on the soil like chalk. Where the clay predominates its action is to alter the texture of the soil. Hence it is of value to sandy soils, since it makes them more compact, and better able to retain moisture. The granular marls loosen the texture of stiff soils and open them to air and moisture. Marl also contains the inorganic elements of plant-food, of which the most important are phosphoric acid and potash. The analysis of the New Jersey green sands proves that they are much richer than the more southern calcareous marls in these elements. Deposits of phosphatic marls have recently been opened in Alabama, which are reported to be very valuable, from containing an unusual proportion of phosphoric acid. Calcareous marls are sometimes used as a source of lime. See FERTILIZERS. (C. M.)

MARRIAGE. See article in the ENCYCLOPÆDIA BRITANNICA, and in this work the articles on DIVORCE, HUSBAND AND WIFE, and INTERNATIONAL LAW.

MARSH, JAMES (1794–1842), an American educator, was born at Hartford, Vt., July 19, 1794. He graduated at Dartmouth College in 1817, and was tutor there till 1820. He then studied theology at Andover, and was ordained to the Congregational ministry in 1824. He was professor of languages at Hampden-Sidney College, Va., 1824–26, president of the University of Vermont from 1826 to 1833, and afterwards professor of moral and intellectual philosophy. He died at Colchester, Vt., July 3, 1842. Dr. Marsh was one of the earliest disciples of Coleridge in America, and by his personal influence and teaching did much to promote the study of Coleridge's writings and diffuse his mode of thought. He was himself thereby led to the study of German at a time when such acquisitions were rare. He contributed many able articles on philosophical and theological topics to leading reviews. See his *Remains*, with memoir by Dr. Joseph Torrey (1843).

MARSH, OTHNIEL CHARLES, an American palæontologist, was born at Lockport, N. Y., Oct. 29, 1831. He was educated at Phillips Academy, Andover, Mass., and at Yale College, graduating at the latter in 1860, and at Yale Scientific School in 1862. He went to Europe in that year, and studied at Berlin, Heidelberg, and Breslau. On his return in 1866 he was appointed professor of palæontology in Yale College. He has carefully investigated the extinct animals of the Rocky Mountain region, and has discovered more than 300 species of fossil animals, which are of great scientific interest.

MARSHALL, a city of Texas, county-seat of Harrison county, is on the Texas and Pacific Railroad main line, at the junction of the New Orleans and Pacific, the Marshall and North-western, and the Sabine Pass and Texas Northern Railroads, 40 miles W. of Shreveport, La. The town has 4 hotels, a national bank, 1 weekly, 1 tri-weekly, and 1 daily paper, 10 churches, and a female college. The town has foundries, car-wheel works, railway machine-shops, and other manufactories. It has a large trade in cotton and other products. Its total valuation is $1,750,000; public debt, $4000. It was founded in 1840. The neighboring country is very fertile, and abounds in good timber and iron ores. In the vicinity are copious mineral springs of high local repute. Population in 1880, 5624.

MARSHALL, HUMPHREY (1812–1872), an American politician, was born at Frankfort, Ky., Jan. 13, 1812. He was the son of Judge John J. Marshall (1785–1846) and grandson of Humphrey Marshall (1760–1841), who published the first history of Kentucky. He graduated at West Point in 1832, and served in the mounted rangers, but resigned in 1833. He then studied law, and began practice at Frankfort, but soon removed to Louisville. In the Mexican war he was colonel of the First Kentucky cavalry, and fought at Buena Vista. In 1849 he was elected to Congress as a Whig, and in 1852 Pres. Fillmore appointed him U. S. commissioner to China, but he was recalled a year later. In 1855 he was again elected to Congress, and served two terms. He resisted secession, desiring Kentucky to remain neutral in the war; but when this proved impracticable, he entered the Confederate service and was appointed a brigadier-general. After being defeated and driven out of Kentucky he was a member of the Confederate Congress, and practised law in Richmond, Va. He afterwards returned to Louisville. He was a favorite public speaker. He died at Louisville, Ky., March 28, 1872.

His uncle, THOMAS ALEXANDER MARSHALL (1794–1871), graduated at Yale College in 1815, was a member of Congress, 1831–35, judge in the Kentucky court of appeals, 1835–56, and chief-justice of that court, 1856–66. He died at Louisville, Ky., April 17, 1871.

MARSHALL, THOMAS FRANCIS (1801–1864), an

American politician, was born at Frankfort, Ky., June 7, 1801. He was a nephew of Chief-Justice JOHN MARSHALL (1755–1835), for whom see ENCYCLOPÆDIA BRITANNICA. Having early entered on the practice of law, he removed to Louisville in 1831, where he acquired high reputation as a pleader and political speaker. He was frequently a member of the legislature, and afterwards judge of the Louisville circuit court. In 1841 he was elected to Congress as a Whig, yet he became a Democrat. He was noted for his eloquence and ready wit, and during his career was engaged in four duels. Though notoriously addicted to intemperance, he became a successful temperance lecturer. He died at Versailles, Ky., Sept. 22, 1864. His *Writings and Speeches* were edited by W. L. Barre (1858).

MARSHALL, WILLIAM CALDER, a Scotch sculptor, was born at Edinburgh in 1813. He studied art in his native city and at London under Chantrey and Baily. He went to Rome in 1836, and settled in London in 1839. He was elected an associate of the Royal Academy in 1844, and an academician in 1852. He first exhibited at the Academy in 1835, and devoted himself chiefly to poetic sculpture. Among his works are The Broken Pitcher (1842); Dancing Girl Reposing (1846); Sabrina (1847); Zephyr and Aurora (1849). He also executed many statues, among which are those of Lords Clarendon and Somers for the Houses of Parliament; of Sir Robert Peel, at Manchester; of Jenner, at Kensington Gardens.

MARSHALLTOWN, a city of Iowa, county-seat of Marshall county, is near the Iowa River, 50 miles N. E. of Des Moines. It is at the junction of several railways, and is finely situated on high ground. It has churches of all the leading denominations, 2 national banks, several daily and weekly newspapers, a high-school, railway-shops, flour- and oil-mills, foundries, large grain elevators, and 2 factories for making steel fencing-wire. The trade in grain and other produce is very large. The town is the business centre of a thriving and fertile region, and is remarkably well built. Population in 1870, 3218; in 1880, 6240.

MARTENSEN, HANS LASSEN (1808–1884), a Danish theologian, was born at Flensborg, Aug. 19, 1808. He was educated at the University of Copenhagen, and afterwards studied at Berlin, Vienna, Munich, and Paris. He was appointed professor of philosophy at Copenhagen in 1840, but afterwards was transferred to the department of theology. He was a disciple of Hegel, but also an orthodox Lutheran, and his able attempts to reconcile thought and belief have established his fame as a metaphysician. In 1845 he became court-preacher, and in 1853 was made bishop of Zealand. Interesting himself in the life of the people, he was a leader in the great religious movement of his time, while by his broad intelligence and sympathy with diverse natures, he was able to prevent enthusiasm from degenerating into license and excess. He died Feb. 3, 1884. Bishop Martensen's first publication, *Mester Eckart* (1840), was a notable restoration of a mediæval mystic to modern sympathy. He next published *Outline of a System of Ethics* (1841), which was finally superseded by his *System of Christian Ethics* (1872). He had in the meantime issued his *Christian Dogmatics* (1849), and by these two works he is chiefly known outside of Denmark. His *Sermons* have been very popular in his own country.

MARTIAL LAW is the exercise of military authority under the laws and usages of war. Martial law is a technical term, and in the United States does not have the same meaning as "military" law, for military law signifies the ordinary military jurisdiction which is used for the government of an army or the parts of an army, and is full and operative where martial law does or does not exist. In the regulations of the U. S. army are found several conditions under which martial law is exercised, and by which, in the interests of humanity, its functions are limited.

1. "A place, district, or country occupied by an enemy stands, in consequence of the occupation, under the martial law of the invading or occupying army, whether any proclamation declaring martial law, or any public warning to the inhabitants, has been issued or not. Martial law is the immediate and direct effect and consequence of occupation or conquest. The presence of a hostile army proclaims its martial law.

2. "Martial law does not cease during the hostile occupation, except by special proclamation, ordered by the commander-in-chief; or by special mention in the treaty of peace concluding the war, when the occupation of a place or territory continues beyond the conclusion of peace as one of the conditions of the same.

3. "Martial law in a hostile country consists in the suspension, by the occupying military authority, of the criminal and civil law, and of the domestic administration and government in the occupied place or territory, and in the substitution of military rule and force for the same, as well as in the dictation of general laws, as far as military necessity requires this suspension, substitution, or dictation. The commander of the forces may proclaim that the administration of all civil and penal law shall continue, either wholly or in part, as in times of peace, unless otherwise ordered by the military authority.

4. "Military oppression is not martial law; it is the abuse of the power which that law confers. As martial law is executed by military force, it is incumbent upon those who administer it to be strictly guided by the principles of justice, honor and humanity—virtues adorning a soldier even more than other men, for the very reason that he possesses the power of his arms against the unarmed.

5. "Martial law should be less stringent in places and countries fully occupied and fairly conquered. Much greater severity may be exercised in places or regions where actual hostilities exist, or are expected and must be prepared for. Its most complete sway is allowed—even in the commander's own country—when face to face with the enemy, because of the absolute necessities of the case, and of the paramount duty to defend the country against invasion. To save the country is paramount to all other considerations.

6. "All civil and penal law shall continue to take its usual course in the enemy's places and territories under martial law, unless interrupted or stopped by order of the occupying military power; but all the functions of the hostile government—legislative, executive, or administrative—whether of a general, provincial, or local character, cease under martial law, or continue only with the sanction, or, if deemed necessary, the participation of the occupier or invader.

7. "Martial law extends to property, and to persons, whether they are subjects of the enemy or aliens to that government.

8. "Consuls, among American and European nations, are not diplomatic agents. Nevertheless, their offices and persons will be subjected to martial law in cases of urgent necessity only; their property and business are not exempted. Any delinquency they commit against the established military rule may be punished as in the case of any other inhabitant, and such punishment furnishes no reasonable ground for international complaint.

9. "The functions of ambassadors, ministers, or other diplomatic agents, accredited by neutral powers to the hostile government, cease, so far as regards the displaced government; but the conquering or occupying power usually recognizes them as temporarily accredited to itself.

10. "Martial law affects chiefly the police and collection of public revenue and taxes, whether imposed by the expelled government or by the invader, and refers mainly to the support and efficiency of the army, its safety, and the safety of its operations.

11. "The law of war (martial) does not only disclaim all cruelty and bad faith concerning engagements concluded with the enemy during the war, but also the breaking of stipulations solemnly contracted by the belligerents in time of peace, and avowedly intended to remain in force in case of war between the contracting powers. It disclaims all extortions and other transactions for individual gain; all acts of private revenge, or connivance at such acts. Offences to the contrary shall be severely punished, and especially so if committed by officers.

12. "Whenever feasible, martial law is carried out in cases of individual offenders by military courts; but sentences of death shall be executed only with the approval of the chief executive, provided the urgency of the case does not require a speedier execution, and then only with the approval of the chief commander."

In general, in time of peace within the United States, martial law must be declared by proclamation, either by the executive of a Territory or State, or by the President of the United States; and its authority is limited, first, by the extent of executive jurisdiction under the laws, and second, by the extent of the territory involved. Usually all the civil jurisdiction which is possible remains in vogue during the disturbance, such as a riot or insurrection, which necessitated the proclamation. (O. O. H.)

MARTIN, Bon Louis Henri (1810–1883), a French historian, was born at St. Quentin, Feb. 20, 1810. The son of a judge, he early had the use of an excellent library left by his maternal grandfather. He was educated at the college of his native town, and having devoted much time to historical studies produced a historical novel, *Wolfthurm* (1830). This was followed by a series of stories founded on the war of the Fronde, *La Vieille Fronde* (1832); *Minuit et Midi* (1832); and *Le Libelliste* (1833). He had already joined with Paul Lacroix (*q. v.*) and others in projecting a history of France, to consist of a series of extracts from the principal histories and chronicles, united by the skill of the editors. But his proposed helpers soon deserted him, and Martin prepared a work of a different kind, a well-digested, uniform history. This *Histoire de France* (15 vols., 1833–36) appeared at first without the author's name, which was added in the tenth volume. A revision of the work was commenced immediately on the conclusion of the first edition, and was comprised in 19 volumes (1837–54). The value of parts of this work was acknowledged by the Gobert prizes bestowed on the author first by the Academy of Inscriptions for volumes X. and XI., relating to the religious wars, and afterwards by the French Academy for volumes XIV., XV., and XVI., relating to the age of Louis XIV. In the fourth edition (16 vols., 1855–60) the whole of the work relating to the Celts and to the feudal age was revised on the basis of new discoveries in archæology. Though thus careful as to facts, the genius of the author inclines rather to generalization than to narrative.

In 1870 Martin was called from his literary labors to be mayor of part of Paris during its siege, and in February following he was elected to the chamber of deputies, where he was active as an extreme republican. His admission to the French Academy gave rise to a lively discussion. M. Martin was a member of the commission on historical monuments and also of many learned and philanthropic societies. Besides his great historical work he published many pamphlets, monographs, and sketches, and a drama, *Vercingetorix* (1865). He also prepared a popular illustrated history of France (6 vols., 1867–84). He died at Paris, Dec. 14, 1883.

MARTIN, Felix, a Canadian ecclesiastic and historian, was born in Normandy, Oct. 4, 1804. He entered the Society of Jesus in 1823, and after several years of service in missions and colleges of his order in France and Belgium was sent to Canada in 1842. He founded St. Mary's College at Montreal and presided over it for many years. He afterwards resided at Quebec, where he gathered materials for the early history of Canada. His eyesight failing he returned to France, and has since resided at Paris. Among his publications are *Mission du Canada* (1861); *Montcalm in Canada* (1867); *Le R. P. Isaac Jogues* (1873).

MARTIN, François Xavier (1764–1846), an American jurist, was born at Marseilles, France, March 17, 1764. He emigrated to Martinique in 1782, and in 1786 removed to New Berne, N. C., where he taught French and learned printing. He then published a newspaper and engaged in the book business. Having been admitted to the bar he prepared a digest of the laws of North Carolina and published various legal hand-books. He also reported the decisions of the State courts and prepared a *History of North Carolina* (2 vols., 1829). In 1808 he was appointed a U. S. judge in Mississippi Territory, and in 1809 was made judge in the Territory of Orleans. He exerted himself to produce harmony among the conflicting systems of jurisprudence there in vogue. In 1813 he was made attorney-general of the State of Louisiana, and in 1815 judge of its Supreme Court. He became totally blind in 1836, but continued to discharge his duties until his death at New Orleans, Dec. 11, 1846. He published reports of the courts in which he was judge down to 1830, and a *History of Louisiana* down to 1814 (1827).

MARTIN, Luther (1744–1826), an American jurist, was born at New Brunswick, N. J., in 1744. He graduated at Princeton College in 1762, and afterwards taught school at Queenstown, Md. He was admitted to the bar in 1771 and settled at Baltimore, where he became a noted lawyer. In 1774 he was a member of the Convention at Annapolis, and defended the rights of the colonies. In 1778 he was made attorney-general of Maryland, and in 1784 was a delegate to the Continental Congress. Although he was in 1787 a member of the Convention which framed the U. S. Constitution, he opposed its ratification by Maryland as giving too much power to the larger States. Yet after its adoption he became a zealous Federalist, and in 1805 was chief counsel of Judge Samuel Chase (*q. v.*) on his trial for impeachment. Martin was also called to defend Aaron Burr at Richmond in 1807, and was equally successful there. He was appointed chief judge of the Court of Oyer and Terminer at Baltimore, and in 1818 became again attorney-general of Maryland. After a stroke of paralysis in 1820 he removed to New York, where he died July 10, 1826.

MARTIN, Sir Theodore, an English lawyer and author, was born at Edinburgh in 1816, and was educated at the high-school of that city. After some years' practice as a solicitor he removed in 1846 to London, where he was a parliamentary agent. Under the signature "Bon Gaultier" he had become known as the writer of vigorous verse, especially in the *Book of Ballads* (1854), prepared in conjunction with Prof. W. E. Aytoun. Martin's skill in poetical translation was shown in his *Poems and Ballads of Goethe* (1858), and further in his excellent version of Henrik Hertz's play, *King Rene's Daughter*, of Oehlenschläger's dramas, *Correggio* (1854) and *Aladdin* (1857). His translations of the *Odes of Horace* (1860) and *Catullus* (1861), reproduce with admirable faithfulness the spirit of the original. He has also translated Dante's *Vita Nuova* and Goethe's *Faust*. He was selected by Queen Victoria as the biographer of Prince Albert, and on accomplishing this task (3 vols., 1874–77) received the honor of knighthood. In 1875 the University of Edinburgh conferred on him the degree of LL.D., and in 1880 he was chosen lord rector of St. Andrew's University. He was married in 1851 to Miss Helen Faucit, a distinguished actress.

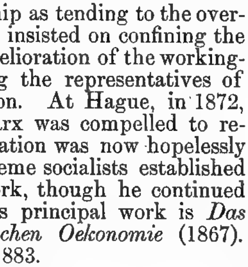
MARTINEAU, James, an English Unitarian preacher and author, was born at Norwich, April 21, 1805. He is a younger brother of Harriet Martineau (for whom see the Encyclopædia Britannica). He was educated by Dr. Lant Carpenter at Bristol, and in the Unitarian College at York. He entered the Unitarian ministry as assistant in a church at Dublin in 1828, and in 1832 accepted a similar position in Liverpool. Here, in 1839, in company with J. H. Thorn and Henry Giles, he conducted a noted theological controversy with several clergymen of the Church of England. In 1841 Mr. Martineau was made professor of mental and moral philosophy in Manchester New College. In 1857 he removed to London, and was minister of a chapel from 1858 to 1872. In 1868 he became principal of Manchester New College, which had been removed to London. He has held the most prominent place among English Unitarians both as a preacher and writer. He is a learned scholar, a profound thinker, and an able disputant. While rejecting many of the orthodox dogmas, he has defended with great vigor spiritual faith against the assaults of atheism and agnosticism. He contributed valuable articles to the *Westminster* and *Prospective* reviews, and was one of the founders of the *National Review*. Among his publications are *Endeavors after the Christian Life* (2 vols., 1843–47); *Miscellanies*, edited by T. Starr King (1852); *Studies of Christianity* (1858); *Essays Philosophical and Theological* (1869); *Religion and Modern Materialism* (1874). He received the degree of D. D. from the University of Leyden in 1875.

MARTINSBURG, a city of West Virginia, county-seat of Berkeley county, is in the Shenandoah Valley, at the junction of the Baltimore and Ohio Railroad with the Cumberland Valley Railroad, 100 miles W. of Baltimore. It has a court-house and other county buildings, 6 large public school-houses, 5 hotels, 2 national-banks, 3 weekly newspapers, 11 churches, 3 flour-mills, a woollen-mill, a foundry, spoke works, extensive railway shops, private machine-shop, a large distillery, and manufactures of pencils, fertilizers, and other goods. It is lighted with gas and has water-works on the Holly system. Its assessed valuation is $1,184,326. Martinsburg was founded in 1733 and incorporated in 1778. It stands in a very picturesque and fertile region, rich in mineral resources. Population in 1870, 4863; in 1880, 6335.

MARX, Karl (1818–1883), a German socialist, was born at Cologne in 1818. He studied philosophy and jurisprudence in the universities of Bonn and Berlin, and became editor of a newspaper at Cologne, which was suppressed for its radical utterances in 1843. He then went to France where he devoted himself to the study of political economy and sociology and contributed satirical articles to German journals. Being expelled from France at the request of Prussia he found refuge in Belgium, and in 1847 took part in the Workingmen's Congress at London. He was in Paris during the revolution of 1848, but soon returned to Cologne and established his paper advocating socialism and refusal to pay taxes. Though it was again suppressed the juries before whom he was tried acquitted him. Finally he was banished from Germany, went to Paris, and was there imprisoned but escaped to London. After carefully maturing his plans he established Sept. 28, 1864, the famous society known as the International. (See Encyclopædia Britannica.) He was a member of the central council which prepared the regulations adopted in 1866 at its Congress at Geneva, and was its corresponding secretary for Germany and Russia. Practically he was the leader and inspirer of all its work. In 1871 the British workmen refused his leadership as tending to the overthrow of all government, and insisted on confining the work of the society to the amelioration of the workingmen's condition and allowing the representatives of each nation freedom of action. At Hague, in 1872, they so far prevailed that Marx was compelled to resign his office, but the association was now hopelessly divided. Marx and the extreme socialists established a central council at New York, though he continued to reside at London. Marx's principal work is *Das Kapital; Kritik der politischen Oekonomie* (1867). He died at London, May 2, 1883.

See Vol. XV. p. 609 Am. ed. (p. 602 Edin. ed.).

MARYLAND, one of the Middle Atlantic States, has a total area of 12,210 square miles, but the land area is only 9,860 square miles. The Chesapeake Bay and Susquehanna River divide the State into two portions, commonly called the Eastern and the Western Shore, the latter comprising nearly two-thirds of the land area.



Agriculture and Stock-Raising.—The following statement shows the product in the State in 1884 of the cereals, potatoes, hay, tobacco, etc.:

Products.	Bushels.	Average per acre.	Number of acres.	Value per bushel, etc.	Total value.
Indian corn..	15,237,000	21.8	698,400	48	$7,313,760
Wheat........	8,260,000	12.8	644,980	83	6,855,800
Rye...........	321,000	11.0	29,294	65	208,650
Oats...........	1,980,000	18.0	110,000	35	693,000
Barley........	7,000	26.1	252	70	4,900
Buckwheat..	135,000	12.7	10,679	70	94,500
Potatoes.......	1,412,000	70.0	20,178	50	706,000
Tobacco (*a*)..	31,255,000	748.0	41,811	7.3	2,281,615
Hay (*b*).......	311,872	1.10	283,520	$12.95	4,038,742
Total......	....	....	1,839,112	....	$22,196,967

(*a*) Pounds. (*b*) Tons.

The U. S. Department of Agriculture estimated the number of animals on farms, total value of each kind, and average price, Jan. 1, 1886, as follows:

Stock.	Number.	Average price.	Total value.
Horses...............	126,496	$81.62	$10,324,641
Mules..................	13,226	108.17	1,430,626
Milch-cows..........	131,063	30.15	3,951,549
Other cattle.........	138,196	25.08	3,466,107
Sheep.................	168,582	3.08	519,739
Hogs..................	299,868	5.95	1,785,115

Work oxen in the State have decreased in numbers since 1880, and mules or horses have been substituted in their stead. Oxen are considered too slow for work, and when turned into beef do not pay, because of the cheap beef from the Western States. Young heifers are kept over for the dairy and the males are sold as soon as possible. Sheep and hogs are raised in the State mostly for home consumption.

Mining and Minerals.—For account of the Cumberland coal-field, see Coal, Vol. II., p. 186. The facilities possessed by this region for transporting its coal to market have largely enhanced its commercial importance. The Baltimore and Ohio Railroad began carrying the coal in 1842, the Chesapeake and Ohio Canal in 1850, and the Pennsylvania State Line branch in 1872. The George's Creek and Cumberland Railroad was completed in December, 1880. The following table shows the amount in long tons of coal shipped in recent years, and the total amount since 1842:

Years.	Baltimore and Ohio.	Chesapeake and Ohio Canal.	Pennsylvania State Line.	Total.
1875...............	1,302,237	879,838	160,698	2,343,773
1876...............	1,070,775	632,440	131,866	1,835,081
1877...............	818,450	584,996	170,884	1,574,330
1878...............	924,254	609,204	145,864	1,679,322
1879...............	1,075,198	501,247	154,264	1,730,709
1880...............	1,319,589	603,125	213,446	2,136,160
1881...............	1,478,502	504,818	278,598	2,261,918
1882...............	1,085,249	269,782	185,435	1,540,466
1883...............	1,434,766	680,119	419,288	2,544,173
1884...............	2,233,928	344,954	356,097	2,934,979
Total since 1842.	30,301,394	14,196,489	2,420,721	46,918,604

Chromium is found and mined in Baltimore, Harford, and Cecil counties. Cobalt has been found near Finksburg, and also near Sykesville, in Carroll county, but not in sufficient quantity to justify mining. Black oxide of manganese is found near Brookville, Montgomery County, but the ore is not now mined. Mica is mined to a small extent in Howard and Montgomery counties. The State has a considerable number of quite important mineral springs, among which are the Carroll White Sulphur Springs, of Alleghany county. Marble of a superior quality is quarried to a limited extent in various portions of the State, the general preference for brick as a building material leaving but little demand for marble.

Manufactures.—The principal mechanical and manufacturing industries of the State are located in or near the city of Baltimore. The following statement shows the condition of the principal industries of the State according to the U. S. Census of 1880:

Mechanical and manufacturing industries.	Establishments.	Capital.	Hands employed.		Wages for the year.	Materials.	Products.
			Males above sixteen.	Females and youths.			
Agricultural implements	36	$395,400	338	18	$117,791	$227,190	$574,672
Bags, other than paper	2	185,000	26	120	33,052	770,000	850,000
Bells	2	480,000	355	180	189,640	295,000	580,000
Boots and shoes	34	590,600	1,271	525	595,603	1,216,118	2,212,963
Bread and bakery products	341	864,022	662	142	275,759	1,507,877	2,275,227
Brick and tile	79	1,168,158	2,049	202	478,189	243,284	933,988
Carriages and wagons	81	355,599	559	8	209,972	238,250	595,860
Clothing, men's	220	3,894,943	5,265	6,029	1,851,938	6,089,052	9,579,066
Confectionery	64	390,665	253	108	119,728	815,692	1,164,755
Cooperage	72	250,090	454	7	164,122	384,800	657,424
Cotton goods	20	4,605,816	1,229	2,826	767,729	2,891,033	4,688,714
Drugs and chemicals	18	655,300	194	47	80,394	531,485	881,125
Fertilizers	48	4,571,870	1,000	13	354,192	3,813,758	5,770,198
Flouring products	546	3,145,520	898	....	219,705	6,965,298	7,954,004
Foundery and machine-shop products.	91	2,684,358	3,116	34	1,509,998	2,103,112	4,454,317
Fruits and vegetables, canned and preserved	114	2,412,692	4,025	10,973	990,758	4,506,332	6,245,297
Furniture	131	863,727	1,058	40	431,352	836,825	1,663,143
Iron and steel	23	4,962,125	2,656	107	905,090	2,888,574	4,470,050
Kaolin and ground earths	7	410,400	192	3	87,580	309,300	559,260
Lard, refined	2	240,000	42	....	20,000	1,445,000	1,544,000
Leather, curried	48	169,127	103	2	36,596	388,608	508,458
Leather, tanned	63	802,343	378	14	127,164	1,039,586	1,468,591
Liquors, distilled	16	715,500	156	1	65,340	858,654	1,202,393
Liquors, malt	53	2,145,590	421	....	200,291	1,001,766	1,820,303
Lumber, sawed	369	1,237,694	1,216	23	223,786	1,106,795	1,813,332
Malt	6	705,000	98	....	52,060	547,000	752,000
Marble and stone work.	59	673,926	863	10	336,327	467,243	1,007,893
Musical instruments, pianos and materials	4	638,382	380	5	200,988	157,699	534,099
Oil, lard	1	75,000	18	....	10,000	500,000	550,000
Paints	11	417,200	113	7	47,751	245,185	412,658
Paper	25	475,048	298	167	119,876	738,140	1,028,591
Patent medicines and compounds	34	222,825	106	154	68,867	438,202	647,893
Printing and publishing	66	2,045,600	797	136	443,989	585.857	1,477,164
Saddlery and harness	154	374,075	556	86	249,313	459,683	1,004,851
Sash, doors, and blinds.	17	463,125	446	38	222,235	411,963	813,005
Ship-building	166	1,606,535	1,178	....	657,789	884,299	1,788,630
Shirts.	38	313,930	328	1,368	307,867	425,947	949,524
Slaughtering and meat-packing	9	865,000	228	....	100,000	3,163,802	3,377,605
Sugar and molasses, refined	3	260,000	106	....	31,000	756,703	840,986
Tin, copper, and sheet-iron ware	226	1,179,267	1,369	326	609,113	2,332,687	3,564,994
Tobacco and snuff	10	602,600	187	868	165,107	1,152,906	1,531,424
Tobacco, cigars and cigarettes	369	623,607	1,184	222	499,666	711,680	1,730,604
Upholstering materials	3	1,151,500	478	244	307,500	527,000	912,850
Woollen goods	14	333,760	171	142	59,491	349,724	488,308

On Jan. 1, 1884, there were 22 blast furnaces in the State; the production of pig-iron in each of the years from 1876 to 1884, was as follows:

Year.	Short tons.	Year.	Short tons.
1876	19,876	1881	48,756
1877	26,959	1882	54,524
1878	24,027	1883	49,153
1879	37,237	1884	27,342
1880	61,437		

Oyster Farming is an important industry of the State, and in dredging the oysters and carrying them to market a large number of persons and vessels are employed for about eight months in the year.

Commerce.—Baltimore is the principal port of the State, and is one of the leading ports in the United States, and ranks about fourth in commercial importance; New York, Boston, and New Orleans taking precedence. The following statement shows the value of exports of domestic and foreign merchandise, and the value of the imports of merchandise at the port of Baltimore for each of the years from 1873 to 1885:

Year.	Exports of domestic merchandise.	Exports of foreign merchandise.	Imports of merchandise.
1873	$19,335,978	$77,546	$29,251,444
1874	27,485,379	179,598	29,283,894
1875	27,437,757	100,165	27,787,451
1876	31,206,807	176,763	22,305,346
1877	39,141,274	67,984	22,322,544
1878	45,492,527	138,543	16,899,855
1879	57,474,495	82,446	14,017,604
1880	76,220,870	25,000	19,945,989
1881	72,444,413	27,280	16,189,816
1882	39,412,642	15,594	14,938,258
1883	54,956,050	47,301	14,599,179
1884	43,064,217	15,077	11,423,665
1885	45,041,634	11,270	11,849,696

Railroads.—The length of lines open Jan. 1, 1885, was 1256 miles; length of lines operated, 1079; capital stock, $45,505,268; funded debt, $43,085,896; total investment, $193,830,160; cost of railroads and equipment, $104,149,009; interest paid on bonds, in 1884, $2,146,072; dividend paid on stocks, $1,648,679.

Canals.—The Chesapeake and Ohio Canal connects Cumberland, Md., with Georgetown (now a part of Washington, D. C.). The length of this canal is 184½ miles; width of surface, 52 to 60 feet; depth, 6 feet; number of locks, 74; cost of construction, $11,375,000. Communication by water is possible between Baltimore and Philadelphia; vessels sailing between the two cities named pass through the Chesapeake and Delaware Canal, which connects the Chesapeake Bay with the Delaware Bay. The length of this canal is 12.6 miles; width of surface, 66 feet; depth, 10 feet; number of locks, 3; cost of construction, $3,547,561.

Education.—The public-school age is 5 to 21 years for whites, and 6 to 20 years for colored. The school population of Maryland according to the U. S. Census of 1880 was 295,215; number enrolled in public schools, 170,393; daily average attendance, 86,486; average duration of school in days, 182. The following statistical summary shows the condition of the public schools in the years 1883 and 1884:

	1882–83.	1883–84.
Youth of school age	310,945	
Attending public schools	161,759	170,393
Average daily attendance	85,320	86,486
Colored pupils enrolled	28,888	31,327
Colored pupils in average attendance	11,850	12,574
Public schools reported	2,061	2,097
Public schools for colored pupils	401	415
Average time of schools, in days	182	182
Teachers employed	3,289	3,353
Teachers in colored schools	519	536
Whole expenditure	$1,603,211	$1,720,264
Amount paid to teachers	1,195,984	1,245,684
Estimated value of school property	2,900,000	

Debt and Taxation.—The amount of State debt on Oct. 1, 1885, was $10,970,363. The debt bears interest at rates ranging from 3.65 per cent. to 6 per cent. As against its public debt, the State holds interest-paying securities amounting to $4,518,799, also $27,320,539 in unproductive securities.

The State receipts for the year ending Oct. 1, 1885, were $2,112,405.61, and the State expenditures for the same period were $2,202,086.67. Amount raised by taxation for the year ending Oct. 1, 1885, was $2,097,376.88. The Constitution prohibits the levying of a poll-tax.

Value of taxable property assessed in 1885, was as follows: Real and personal, $473,425,144; corporation property, $61,311,375. The rate of State tax in 1885 was 18¾ cents on $100. (C. T. D.)

MASON, CHARLES (1730–1787), an English astronomer, whose name is perpetuated in Mason and Dixon's Line, was an assistant at Greenwich Observatory. He was sent with Jeremiah Dixon to the Cape of Good Hope to observe the transit of Venus of June 6, 1761. In 1763 the same persons were commissioned by the proprietors of Pennsylvania and Maryland to run the boundary line between those provinces. They arrived at Philadelphia Nov. 13, 1763, and completed their task Dec. 26, 1767. Astronomical observations made in connection with their work are recorded in the *Transactions* of the Royal Society. They returned to England in 1768, and Mason observed another transit of Venus at Cavan, Ireland, in June, 1769. He was afterwards employed in correcting Mayer's *Lunar Tables* (1787). He returned to America and died at Philadelphia in February, 1787. (See *Historical Magazine*, July, 1861.) Mason's associate, Dixon, died at Durham, England, in 1777.

MASON, GEORGE (1726–1792), an American statesman, was born at Doeg's Neck, Fairfax co., Va., in 1726. He was descended from George Mason, an English royalist, who had taken refuge in Virginia about 1652. He drafted the non-importation resolutions adopted by the Virginia Assembly in 1769, and was a member of the committee of safety in 1775. In the next year he prepared the declaration of rights and the Constitution of Virginia, which were unanimously adopted. He assisted Jefferson in establishing religious liberty in the State. He was elected to the Continental Congress in 1777. In 1787 he was a member of the convention which framed the Constitution of the United States, yet he opposed the plan adopted partly on account of the favor it showed to slavery, which he regarded as a source of national weakness, and partly on account of aristocratic and monarchical features which he discerned in the document. In the Virginia Convention he joined with Patrick Henry in urging the rejection of the Constitution. Of the twenty alterations which they proposed several were afterwards adopted as amendments. Though elected to the U. S. Senate, Mason declined the office, devoting himself to study and field sports. He died Oct. 7, 1792.

MASON, JAMES MURRAY (1798–1871), an American statesman, grandson of the preceding, was born on Analosta Island, Fairfax co., Va., Nov. 3, 1798. He graduated at the University of Pennsylvania in 1818, studied law at William and Mary College and was admitted to the bar in 1820. He was elected to the Virginia legislature in 1826 and to Congress in 1837. He was U. S. Senator from 1847 to 1861, and was chairman of the committee on foreign relations. He was conspicuous in his advocacy of slavery, and was the author of the Fugitive Slave Law of 1850. To testify his opposition to Northern manufactures, he wore for some years only Virginia homespun clothes. In July, 1861, he was expelled from the Senate for taking part in the rebellion. After serving a short time in the Confederate Congress he was appointed with John Slidell as commissioner from the Confederate government to seek recognition from European governments. Being captured in the British mail-packet Trent, by Capt. Wilkes, Nov. 8, 1861, the commissioners were confined in Fort Warren, Boston Harbor, until Jan. 2, 1862, when they were released in compliance with the demand of the British government. Proceeding then to England and France they were courteously received, but failed in the main object of their mission. After the war Mason returned to Virginia, and died at Alexandria, Va., April 29, 1871.

MASON, JEREMIAH (1768–1848), an American lawyer, was born at Lebanon, Conn., April 27, 1768. He was descended from Capt. John Mason (1600–72), and was son of Col. Jeremiah Mason (*d.* 1813) a Revolutionary officer. He graduated at Yale College in 1788, studied law, and was admitted to the Vermont bar in 1791. He began practice at Westmoreland, N. H., but in 1797 removed to Portsmouth, where he became the head of his profession in the State. In 1802 he was appointed State attorney-general. From 1813 to 1817 he was U. S. Senator, and took a prominent part in discussing the war with Great Britain. He was frequently a member of the State legislature and was active in revising the State code. In 1832 he removed to Boston, where he maintained his eminence as a lawyer. Daniel Webster declared that his own professional ability was due to daily association with Mr. Mason for nine years. Mason died at Boston, Oct. 14, 1848.

MASON, JOHN (*d.* 1635), the founder of New Hampshire, was born at King's Lynn, Norfolk, England. He was sent by King James in 1610 to subdue a rebellion in the Hebrides, and in 1617 he explored the coast of New England. About this time he was governor of Newfoundland, and having surveyed that island published a map and description of it. On

March 9, 1622, he obtained a grant of land, called Mariana, between Naumkeag and Merrimack Rivers, and in August, jointly with Sir Ferdinando Gorges (*q. v.*), a patent for the province of Maine. Gorges and Mason were strenuous upholders of the Established Church and all the feudal usages, which they wished to transfer to New England. In 1623 they sent over the first shipload of settlers, who founded Portsmouth and Dover in New Hampshire. From 1624 to 1629 Mason was busy with duties as paymaster of the king's armies in the war with Spain, but on Nov. 7, 1629, he obtained a new patent for New Hampshire, between the Merrimack and Piscataqua Rivers. In 1632 he was made a member of the council for New England, and soon after was its vice-president. His settlers did not readily submit to the regulations which were made for them. In October, 1635, he was appointed vice-admiral of New England, but before entering on the office he died at London, in December, 1635. His grandson made strenuous efforts to assert his proprietary rights, but with little success, and the dispute was kept up for over a century.

Another John Mason (1600–1672) is noted in the colonial history of Connecticut. He came to America in 1630, and was one of the founders of Windsor, Conn., in 1635. He was the leader of the colonists in the Pequot war, and on May 26, 1637, destroyed nearly 700 Indians in their stronghold. He wrote a *History* of the war.

MASON, John Mitchell (1770–1829), an American clergyman, was born at New York, March 19, 1770. His father, John Mason (1734–1792), a native of Scotland, was pastor of the Associate Reformed Church in New York. The son graduated at Columbia College in 1789, and after studying theology with his father for two years went to the University of Edinburgh. Soon recalled by his father's death, he succeeded to his father's charge in 1793. He was an eloquent preacher and the leader of his denomination. In 1801 he was sent by his Synod to Scotland and Ireland to procure a supply of ministers. His visit was extended to London, where he preached before the London Missionary Society a notable sermon on *Messiah's Throne.* When his Synod founded a Theological Seminary in 1805 Dr. Mason, who had received his degree from the University of Pennsylvania, was made the professor of theology. He based all his teaching directly on the Bible in the original languages, and required his students to become familiar with this text-book. In 1806 he established the *Christian's Magazine*, in which he opposed the High Church views of Bishop Hobart. In 1810 Dr. Mason, having formed a congregation with part of his original flock, came into such friendly relations with a Presbyterian Church that they united with them in the Lord's Supper. After being tried before his Synod for this act he summed up his defence in his *Plea for Sacramental Communion on Catholic Principles* (1816). In the meantime Dr. Mason had been provost of Columbia College from 1811 to 1816. He was also one of the founders of the American Bible Society and was its foreign secretary. During a visit to Europe in 1816–17 he was influential in reviving evangelical faith in the churches of Switzerland. In 1821 he accepted a call to the presidency of Dickinson College, Carlisle, Pa., but resigned in 1824. While holding this post he had united with the Presbyterian Church. Returning to New York, worn out with work, he lived in retirement until his death, Dec. 26, 1829. His *Works* were edited by his son, Rev. Ebenezer Mason (4 vols., 1832; 2d ed., 1849). See his *Memoirs* by Rev. J. Van Vechten (1856).

MASON, John Young (1799–1859), an American statesman, was born at Greensville, Va., April 18, 1799. He graduated at the University of North Carolina in 1816, became a lawyer, and was frequently elected to the Virginia legislature. In 1831 he was elected to Congress, and in 1837 he was appointed U. S. judge for the district of Virginia. Pres. Tyler appointed him secretary of the navy in March, 1844, and Pres. Polk retained him in the Cabinet, first as attorney-general until September, 1846, and afterwards as secretary of the navy. Pres. Pierce appointed him U. S. Minister to France. He was a noted advocate of slavery and took part in the Ostend manifesto, which declared the purpose of the United States to obtain possession of Cuba. He died at Paris, Oct. 3, 1859.

MASON, Lowell (1792–1872), an American teacher of music, was born at Medfield, Mass., Jan. 8, 1792. He was a choir leader and instructor at Savannah, Ga., in 1812, and in 1821 published the *Handel and Haydn Collection of Church Music.* In 1827 he removed to Boston and thence extended his work over all New England, improving church music and introducing choirs. He assisted in establishing the Boston Academy of Music, but he devoted himself especially to cultivating a popular love of music. He published more than forty collections, chiefly of church and Sunday-school music. In 1855 the University of New York conferred on him the degree of "Doctor in Music," the first ever granted in the United States. He died at Orange, N. J., Aug. 11, 1872.

MASON and DIXON'S LINE, the southern boundary of Pennsylvania, separating it from Maryland and Virginia. It became famous as the dividing line between the Free and Slave States. Owing to incorrect statements in the original grants of Maryland and Pennsylvania, serious disputes arose between the families of William Penn and Lord Baltimore. An agreement was made in 1732 with regard to the boundaries of Maryland, Pennsylvania, and Delaware, the latter then belonging also to the Penn family. Commissioners were appointed to run the lines in 1732, 1739, and 1750, but could not agree. Finally the decision of Lord Chancellor Hardwick in 1750 was accepted in an agreement signed July 4, 1760, and commissioners then appointed spent three years in settling the boundary between Delaware and Maryland. Then the need of better mathematicians being felt, Messrs. Charles Mason (*q. v.*) and Jeremiah Dixon were sent out. Arriving at Philadelphia Nov. 13, 1763, they began by revising the work of their predecessors, and afterwards ran the Pennsylvania line, which they fixed at N. lat. 39° 43′ 26.3″. They marked this line at intervals of a mile by erecting stones having P on one side and M on the other, while every fifth mile was marked by a larger stone with the arms of the Penn family on one side and those of Lord Baltimore on the other. When they were within 36 miles of the terminus the surveyors were stopped in their work by the hostility of the Indians in the summer of 1767. Mason and Dixon then returned to England. In November, 1782, Col. Alexander McClean, of Pennsylvania, and Joseph Neville, of Virginia, ran the remainder of the line, which was verified by astronomical observation and permanently marked in 1784. Again in 1849 Lieut.-Col. James D. Graham of the U. S. Topographical Engineers, revised the former surveys, finding them practically correct.

MASPERO, Gaston Camille Charles, a French Egyptologist, was born at Paris, June 24, 1846. He was educated at the Lycée Louis le Grande and entered the Normal School in 1865. He visited South America in 1867, when he studied the Quichua language. In 1868 he began to lecture on Egyptian archæology, and in 1874 was made professor of that branch in the Collége de France. In 1880 he founded a school of oriental archæology at Cairo, and in 1881 on the death of Mariette (see Encyclopædia Britannica) he was made director of the excavations throughout Egypt. In 1883 he was made a member of the Academy of Inscriptions. In 1870 he founded a *Recueil de travaux relatifs à l' archéologie et la philologie égyptienne et assyrienne.* Besides other works he has published *Histoire ancienne des peuples de l' Orient* (1875), which has passed through many editions. He also edited Mariette's *Remains.*

See Vol. XV. p. 617 Am. ed. (p. 611 Edin. ed.).

MASSACHUSETTS. *History.*—The first settlement in what is now known as Massachusetts was made at Plymouth, in 1620, by Puritan non-conformists, Independents, or in modern phrase, Congregationalists. The colony of Plymouth had no charter but held its territory by patent from the Council for New England, and after seventy years of separate existence was incorporated with Massachusetts under the Provincial charter. It was an humble community, at the end of 4 years, consisting of 32 cabins and 180 inhabitants. In 11 years more the number was raised to 500, and when its separate existence was ended it had a population of about 8000 souls. The history of Plymouth is free from the imputation of religious intolerance which defaces some pages in the annals of Massachusetts. It cannot be shown that the Pilgrim Colonists had a more enlightened theory of religious liberty than the Puritan settlers of Massachusetts, but they happily accomplished in practice a more lenient administration of government.

The colony of Massachusetts was founded by a company of men having more wealth and consideration in England than the Plymouth settlers, and their proceedings were marked from the first by great energy and sagacity. The end of their enterprise was undoubtedly to obtain a secure refuge for the enjoyment of their religion, free from the compulsory jurisdiction of the civil and ecclesiastical powers of the crown. This it was proposed to effect by establishing virtual independence. Their charter empowered them to transport colonists and govern them. They transferred the charter to America and organized themselves under it, thus establishing self-government. Their right to do this has been denied, but the charter seems to have been drawn in such terms as to admit the construction on which they acted, and probably with design to favor such a construction. More effectually to accomplish their far-reaching purpose they resorted to a strained construction of their charter. By its terms they were authorized to admit new associates and establish the conditions of their admission; they were empowered to repel invaders; but they claimed the right to exclude from their territory all "dangerous" or disaffected persons, especially those who were ill-affected toward the Puritan system of religion and worship. Religious intolerance was justified on the plea of self-defence. A theocracy was set up. No man could be a freeman of the colony who was not a member of some church within the same, and no church could be formed without the authority of the General Court. On the other hand the provision that authorized them to make laws and ordinances "not repugnant to the laws of England" was availed of to enact laws that were in direct opposition to those of the realm. When proceedings were begun in 1634 to vacate their charter their first measures were to fortify Boston Harbor, and to order "the drilling of unskilful men," to collect arms and ammunition, and to appoint a committee "to consult, direct, and give command for the managing and ordering of any war that might befall for the space of a year next ensuing. The union of the New England colonies, which was justified by much talk of danger from Indians and the Dutch, was not improbably devised with an eye to more distant dangers. It is not an impossible supposition that, but for the fall of the Stuarts, the struggle for independence might have been anticipated by a hundred years, with what results it were vain to conjecture.

But the civil war in England was the opportunity for the growth and secure protection of New England. The Commonwealth and Protectorate were friendly Under the restored Stuarts the pressure of royal power was again felt. A stop was put to religious persecution. The church-membership qualification for suffrage was abolished. But attacks upon the charter were parried with a skill and address that the most astute diplomatist might have envied, until in 1685 it was vacated. The revolution of 1688 was anticipated in a revolt of the colony, but hopes of a restoration of the charter were doomed to disappointment. The colony entered upon a new stage of existence as direct dependents upon the crown. Under the new Provincial Charter, with a governor representing the royal authority by which he was appointed, a Puritan establishment was impossible. But an ingenious substitute was devised. It was enacted that the people of each town (or parish, in case a town were sub-divided into parishes) might elect their own minister, whose support was to be provided for by taxation. If a town had a majority of Puritans the minister was Puritan, if the Episcopalians or Baptists should prevail the ecclesiastical complexion would vary accordingly. But no "new plantation" had been permitted without authority from the General Court, and sixty years' possession had given the Puritan polity preponderance in nearly all the towns. One had been settled by Welsh Baptists, and no parochial organization interfered with their spiritual freedom. But that was a singular case. While the Provincial legislation preserved a decorous freedom from the seeming of intolerance, every parish was an establishment of itself. What distinguished it from any that had ever before existed in Christendom was the apparent non-existence of churches. The ministers were the ministers of *towns*. This anomalous condition was removed by a law establishing or authorizing that joint action of church and parish and ecclesiastical council, in settling ministers, which has so long been the common law of Congregationalism. No consideration was given to minorities. All the inhabitants were taxed to support the ministers of the majority. This system was riveted upon the Commonwealth by the Constitution adopted in 1780, with some scanty concessions to minorities of different religious denominations. It had one result which its founders probably did not anticipate. When inheritors of Puritan independency departed from Puritan theology, it came to pass in some cases that a parish became Unitarian while the church continued orthodox. The law vested the entire church property, even to the records and communion service, in the parish, and the church representing the ancestral faith was ousted from its sanctuary, compelled to go out and lay new foundations, becoming even as "dissenters," with leisure to meditate on the blessings of a union between church and town. In 1815 an act was passed by which certificated members of other religious societies were no longer liable to parochial taxation. An amendment to the Constitution, in 1833, swept away the last vestige of an established religion. The governors still continue, in accordance with custom, to appoint Fast days and Thanksgiving days, but the only force possessed by those documents is to make the days legal holidays, closing schools and banks, and suspending labor. The invocation, "God save the Commonwealth of Massachusetts!" which superseded the ancient form, "God save the King!" sounds like a solemn echo from the past.

Population.—Until within the last fifty years the population of the Commonwealth was of nearly unmixed English descent. English emigration to New England began in 1620, and in 1640 it had nearly ceased. The settlers, estimated to number 21,000, thenceforth multiplied in seclusion from foreign influences for the next 150 years. The numerous Irish, German, and French Canadian immigrants, with a sprinkling of other nationalities, have remained to a great extent unamalgamated elements of the population, the native stock continuing homogeneous. The statistics of the census do not completely discriminate between the nationalities, as immigrants, in the second generation, are native-born, though not of native descent. It has been asserted that there is an alarming annual diminution of the native stock, arising from the fact that the birth-rate of the foreign-descended is higher than that of the native. But the death-rate is also higher, so that the proportionate increase is not to be ascertained by a single comparison. Beginning near the close of the last century swarms of emigrants have gone from New England westward, establishing a Newer England in the vast North-west region of the United States.

The distribution of population in the Commonwealth has been greatly modified within the present century. Massachusetts was till then almost wholly an agricultural State. Commerce had formerly flourished in the sea-coast towns, but the protective policy diverted capital into manufacturing. Lowell, now a city of nearly 60,000 people, was incorporated as a town in 1826. But then and for many years the large majority of the population was rural, the manufacturing towns and villages being regarded as exceptional communities. Such a city as Lowell was a curiosity to be visited and described by strangers. Within the last twenty-five years the substitution of machinery for hand-work in numerous branches of production has caused an immense development of the manufacturing system, until, as the last census disclosed, a majority of the population inhabit cities of 12,000 inhabitants and upward.

A census was taken by the State authorities in 1885, from which it appears that the total population was 1,942,141, of which 1,009,257 were females and 932,884 were males; or 51.97 per cent. of females to 48.03 per cent. of males. A population which suffers an annual drain from emigration will naturally have more women than men, because more men than women emigrate. This disproportion is increased in communities where many of the men follow dangerous occupations, as in the fishing ports. And since twenty-one years have not elapsed since the nation emerged from the bloodiest civil war in modern history, to the armies and to the death-rolls of which Massachusetts contributed her full quota of young and able-bodied men, the disproportion of the sexes is as small as could be looked for.

Government.—For more than two hundred years Massachusetts, in common with the other New England States, lived under the most highly developed democratic form of government the world had ever seen. Every township was incorporated as a "town," all the qualified voters of which (being practically the whole adult male population), in town-meeting assembled, elected their officers, levied local taxes, and appropriated moneys for the town expenses, and elected members to the lower branch of the legislature. The House of Representatives of Massachusetts grew to be more numerous than the British House of Commons. The number was diminished by successive reductions until the system of town representation was abolished, and the present district system substituted. With these democratic institutions is combined a most conservative judicial system. The judges are appointed to hold their offices during good behavior, and the judiciary have commanded the highest respect of the profession and of the people. It is often loosely remarked that the common law of England is in force in America, except so far as legislation has departed from it. But this assertion is subject to important qualification so far as Massachusetts is concerned. Her Constitution continued in force all laws that had been in force in the Province of Massachusetts Bay, except such as were inconsistent with the Constitution until altered or repealed by the legislature. That antecedent law is therefore "the common law" of Massachusetts. Some principles and rules of English law, which were fully accepted by the courts of other States, were not recognized as law by Massachusetts courts; her judiciary were conservative of her own laws and usages. If such peculiarities are now less numerous, it is due to the general progress of American law. The immense industrial and railway development of the State has called for a corresponding advance in her legislative and administrative policy, but the movement has been cautious and measured. There has been as little as possible of direct interference by government. Publicity is made a positive force. An instance of this is seen in the railroad commission, an organization that has been copied by several States. The commission has no power, except to bring parties at variance to a public hearing; its decisions have no compulsory force, but only the force of their intrinsic reasonableness, and the knowledge that they move public opinion and will appeal to the legislature if finally necessary. The bureau of labor statistics has no administrative power. It collects statistics, tabulates them, and reports upon them. These facts and reports make their own impression on the public mind and on the legislature, and an important influence is exerted in favor of enlightened remedial legislation.

Education.—The education of youth received attention at the very beginning of the colony of Massachusetts. Harvard College was founded in 1636, and its reputation grew in a few years to such a degree that in several instances sons of opulent families in England were sent thither for their education. Boston at about the same time had set up a school. The general court ordered that parents and masters should see that their children and apprentices were taught to read. Roxbury and other towns voluntarily provided schools for themselves. In 1647, "that learning may not be buried in the graves of our fathers in church and commonwealth," a public-school system was established on a basis that has continued substantially unchanged. It was ordered that in every township containing 50 householders a school to teach reading and writing should be maintained, and in every town of 100 families a grammar school should be set up with a master qualified to fit youth for the university. Authority was given to support such schools by local taxation. Here in germ was the whole apparatus of public education as it is seen in our day, vitalized by the provision for sustaining it at the public cost. The Commonwealth has been so forward in elevating the aims and invigorating the methods of schools as in providing for their support. In 1837, Edward Everett being governor, the board of education was created, and Horace Mann was appointed its secretary. During the eleven years of his incumbency his reports gave an impulse to the school system, not only of the State but of the country, and some of his reports were republished in England. The Commonwealth has had an honorable pride in her schools, and a more honorable discontent with them as long as any improvement is possible. In 1855 an amendment to her Constitution made the ability to read and write in the English language a qualification of voters. Previous to the civil war the militia system as to large portions of the State existed only on paper. It has since been more carefully fostered, and the scholars of high schools are regularly organized in companies and battalions, those of Boston constituting a regiment; their military exercises are as punctually required as other school exercises, an exception being, of course, made in favor of scholars whose parents have conscientious scruples against bearing arms. The question whether school-drill is any substantial advantage to the militia system has been mooted, but without impairing the faith of the school authorities in its benefits.

To these institutions of general education the State adds liberal provision for the special education of unfortunate and dependent classes: schools for the blind, for deaf mutes, for the idiotic and feeble-minded, reformatory schools for juvenile offenders and truants. These institutions, including hospitals for the insane, come under the general designation of State charities. Some of the penal institutions of the Commonwealth, in their spirit, might be classed with these. Of three State prisons one is for women, and is under the direction of women, and one of those for men has been reorganized as a reformatory, older and less corrigible offenders being withdrawn to be by themselves in the remaining prison. By these classifications the possibility of reclaiming immature transgressors, at least, is cherished and made the most of. The changes which have taken place in the character of the population, and in the conditions of industry, have taxed and will continue severely to tax the wisdom of the commonwealth. The problem now in process of solution is to make institutions of government, devised for a society presenting very different conditions of existence, adequate to the demands made upon them in this modern age and by the modern spirit. (L. E. S.)

Agriculture.—According to the U. S. Department of Agriculture the total land surface of Massachusetts is 5,145,600 acres, of which 3,359,679 acres are in farms, valued at $146,197,415. In 1885 the cereal productions were as follows: Indian corn, 1,406,153 bushels; wheat, 22,988 bushels; oats, 634,751 bushels; rye, 355,431 bushels; barley, 79,425 bushels; buckwheat, 58,959 bushels. The live-stock of the State is given as follows: Horses, 62,663; milch-cows, 169,968; oxen and other cattle, 108,382; sheep, 64,561; hogs, 77,616.

Manufactures.—The accompanying table, prepared from the U. S. census report for 1880, presents only the principal manufactures, but the totals include all the mechanical and manufacturing industries of the State.

Mechanical and manufacturing industries.	Establishments.	Capital.	Total amount paid in wages during the year.	Materials.	Products.
		Dollars.	Dollars.	Dollars.	Dollars.
Agricul. impl'ts...	29	910,000	365,896	634,752	1,670,242
Bookbinding.......	75	626,278	524,947	539,481	1,360,577
Boots and shoes...	988	21,098,133	24,875,106	59,906,773	95,900,510
Cut stock.........	163	1,190,600	700,432	5,861,084	7,397,734
Findings..........	64	318,600	234,728	652,865	1,155,923
Rubber............	1	500,000	296,442	1,068,006	1,707,842
Boxes, paper........	60	296,175	302,856	459,575	967,218
Wooden...........	109	698,780	367,118	1,044,364	1 768,308
Brass and copper..	4	1,300,000	201,405	1,310,456	1,756,051
Brass castings......	49	361,300	191,300	411,853	756,424
Brick and tile ...	114	1,668,200	465,589	521,875	1,322,628
Brooms & brushes	58	545,500	290,854	821,342	1,451,660
Buttons...............	28	590,900	391,974	411,009	1,085,864
Carpets...............	7	4,637,646	1,223 302	3,950,673	6,337,629
Carriages & wag's.	215	2,027,250	1,273,986	1,952,237	4,048,141
Materials..........	31	413,550	164,895	432,151	737,626
Cars and repairs ..	[illegible]	852,250	332,553	1,024,960	1,480,611
Chocolate............	3	475,000	56,055	655,000	1,045,000
Clothing, men's...	347	5,172,043	3,832,244	10,846,464	17,902,662
Women's	34	389,100	470,195	1,155,652	2,020,038
Confectionery......	76	490,175	288,868	1,529,340	2,281,850
Cordage and twine	29	1,533,450	344,607	2,195,311	2,995,395
Corsets	11	158,400	338,562	557,100	1,018,025
Cotton goods.......	206	74,118,801	16,250,908	37,542,679	74,780,835
Cutlery...............	63	2,028,722	808,788	872,878	2,133,654
Drugs & chem'ls...	38	1,120,350	185,274	1,035,694	1,676,630
Dyeing................	28	8,613,500	1,815,431	4,566,174	9,482,939
Envelopes............	6	555,000	235,227	1,598,350	2,070,346
Felt goods...........	11	820,000	163,440	1,198,339	1,627,320
Fertilizers...........	21	1,738,150	225,813	1,384,875	2,164,680
Fire-arms............	12	3,321,455	619,816	342,655	1,158,227
Flour, etc............	350	2,880,365	290,070	7,814,583	8,774,049
Foundry products.	549	16,466,535	8,131,740	11,236,199	23,935,604
Furniture	305	3,413,275	2,809,438	4,779,248	9,332,455
Hats and caps......	37	199,500	236,752	401,357	901,666
Hosiery, etc.........	57	1,467,375	608,067	1,394,748	2,483,596
Iron manufactur's	19	835,000	314,502	845,044	1,491,555
Iron nails & spikes	36	2,336.055	657,287	1,970,352	3,126,275
Iron and steel.....	30	6,738,408	2,576,539	6,657,232	10,288,921
Jewelry..............	105	1,936,800	1,464,993	1,681,034	4,265,525
Leather, curried...	194	4,308,169	1,939,122	19,547,978	23,282,775
Dressed skins....	27	513,950	280,809	1,359,920	1,931,617
Tanned............	133	2,712,130	1,093,973	11,320,288	13,556,721
Liquors, distilled.	10	583,840	67,828	740,060	1,104,391
Malt...............	31	3,285,400	563,547	2,855,046	5,112,227
Lithographing.....	13	534,650	352,983	463,360	1,046,676
Lumber, planed...	39	742,700	233,442	773,973	1,197,371
Sawed.............	606	2.480,340	431,612	1,904,105	3,120,184
Marble & stone wk	199	1,273,489	835,244	1,061,482	2,574,182
Mattresses, etc.....	44	267,212	188,211	658,433	1,008,793
Mixed textiles.....	69	7,166,800	2,528,476	7,570,885	13,043,829
Organs & mater'ls	31	1,324,866	876,785	1,028,501	2,354,243
Paper.................	96	11,722,046	2,467,359	9,213,221	15,188,196
Patent medicines.	40	[illegible]	187,607	664,486	1,456,376
Pianos & materials	45	1,905,750	890,721	1,132,847	2,652,856
Printing, etc........	280	3,712,869	2,774,818	2,621,983	7,757,260
Rubber goods, etc.	22	1,811,000	649,016	2,722,916	4,206,465
Saddlery............	294	520,625	372,914	750,912	1,497,600
Sewing-machines.	12	1,052,200	445,377	634,229	1,366,696
Shipbuilding.......	276	1,765,450	804,571	1,173,640	2,281,666
Shoddy...............	30	460,500	[illegible]	1,308,715	2,305,985
Silk & silk goods..	22	1,306,900	[illegible]	1,990,515	2,764,260
Slaughtering, etc.	77	2,904,440	653,149	20,657,330	22,951,782
Soap and candles.	119	2,005,325	306,539	3,492,604	4,489,555
Steam fittings, etc.	18	1,068,000	369,556	536,984	1,196,544
Straw goods........	33	2,361,960	1,968,232	4,117,162	6,898,628
Sugar & molasses.	5	1,979,500	288,860	21,282,764	22,880,439
Tinware, etc........	375	1,323,253	731,647	1,426,392	2,901,133
Tobacco	271	675,111	595,355	1,111,135	2,074,219
Watches & cases..	10	1,945,500	998,987	1,004,561	2,343,284
Whips.................	47	630,410	226,784	381,293	962,892
Wire & wire work.	34	2,070,375	1,134,328	3,440,354	5,301,280
Wood, turned, etc.	118	666,360	413,236	637,795	1,350,018
Wool hats...........	[illegible]	430,325	313,935	829,100	1,438,041
Woollen goods.....	167	24,680,782	7,457,115	27,839,583	45,099,203
Worsted goods.....	23	6,195,247	1,870,030	6,465,476	10,466,016
All industries...	14,352	303,806,185	128,315,362	386,972,655	631,135,284

Education.—In 1883–4 the number of public schools was reported as 6,358, with 342,012 pupils and 7,950 teachers. The number of high schools was 228, with 20,072 pupils and 634 teachers. There were 125 evening schools, with 13,231 pupils and 501 teachers. The total amount expended upon public schools, including the expense of repairing and erecting school-houses, was $6,502,359, which is nearly $20 for each child in the State between the ages of 5 and 15 years. The State also expends $33,554 for its school for the deaf and dumb, $30,000 for the school for the blind, $10,764 for the school for the feeble-minded, $53,500 for primary school at the State Almshouse, $29,477 for the school at the Boys' Reformatory, and $16,120 for the Girls' Industrial School. In the State and city reformatory and charitable schools about 1500 children received instruction.

In the years 1881–85 there were landed at Boston 188,401 immigrants, chiefly from the British Isles.

Railroads.—According to the report of the railroad commissioners of the State of Massachusetts, the length of main lines in 1885 was 1,973,708 miles, of double track 667,899 miles, and of sidings 832,393 miles. The average cost of standard-gauge roads is $63,133.12. The total amount of dividends paid was $6,535,054. The total number of employés is 34,436.

Banks.—According to the comptroller of the currency, on Jan. 1, 1886, the number of national banks in Massachusetts was 262; of which there were in liquidation 13, and in operation 249. The capital stock paid in was $97,251,830; the U. S. bonds and deposits were $64,278,250. The total circulation issued was $273,780,315, of which $211,975,698 had been redeemed, leaving $61,804,617 outstanding. The total bank surplus was $24,931,943.

There were also 6 trust companies, with a total capital of $8,434,349. Their deposits amounted to $7,444,311. There were 46 private bankers, with a total capital of $4,733,750. Their deposits amounted to $2,670,631. In the 146 savings banks of the State the deposits were $209,307,095, and the dividends $10,284,661.

Finances.—On Jan. 1, 1885, the State debt amounted to $31,432,681, bearing 5 per cent. interest. The sinking fund at the same date contained $21,048,829, leaving the net indebtedness $10,388,852. The State receipts for the previous year were $8,579,207 from revenue and $5,928,132 on account of funds. The expenditures were, for public debt, $1,620,328; for other current outlay, $6,784,865; on account of funds, $5,461,481. The total assessment was as follows: Real estate, $1,258,452,712, and personal property, $498,427,008, making a total of $1,756,879,778. The amount raised by State taxation was $2,702,922, but the total taxation for all purposes for the year ending May 1, 1884, was $29,362,720, of which nearly 90 per cent. was for municipal purposes. The poll tax is $2, and the amount raised by this tax in 1884 was $1,014,701.

MASSEY, GERALD, an English poet, was born near Tring, Hertfordshire, May 29, 1828. He began to work in a mill when only 8 years of age, and went to London when 15. In 1849 in company with some fellow workmen he began a weekly newspaper called the *Spirit of Freedom.* He assisted Rev. F. D. Maurice in his efforts to benefit the working classes. He lectured in many places in Great Britain, and in 1873 visited the United States. He received a pension in 1863, and was presented with a rustic cottage by Lord Brownlow. His first poem of special merit was the *Ballad of Babe Christabel* (1854). His later books are *Craigcrook Castle* (1856); *Voices of Freedom and Lyrics of Love* (1859); *Shakespeare's Sonnets never before Interpreted* (1866), and *A Tale of Eternity* (1870).

MASSILLON, a city of Ohio, in Stark county, is situated on the Ohio Canal and the Tuscarawas River, 65 miles S. of Cleveland. It is on 4 lines of railway. The city is handsomely planned, with good and regular streets. It has a fine opera-house, a large high-school building, the Roach Institute, 5 hotels, 2 national banks, and 1 other bank, 2 weekly newspapers, 9 churches, excellent graded schools, 4 flouring-mills, 3 glass-works, 3 foundries, a rolling-mill, large quarries, gas-works, public water-works, and a park. Much coal is mined near the town for shipment. The city debt is $22,000. Massillon was founded in 1826, and incorporated in 1853. The population in 1880 was 6836; in 1885, 9245.

MASSON, DAVID, a British author, was born at Aberdeen, Scotland, Dec. 22, 1822. He was educated at Marischal College and at the University of Edinburgh. In 1841 he became editor of a newspaper, and in 1844 went to London, where he contributed to various periodicals. The ability and scholarship shown in his articles led to his appointment in 1852 as professor of English language and literature in the University College, London. From 1858 to 1868 he was also editor of *MacMillan's Magazine.* In 1865 he was called to the professorship of English literature in the University of Edinburgh, which he still retains. His principal work, *The Life of Milton and History of his Time* (6 vols. 1859–80), is a monument of patient, unwearying research. Its plan is faulty, as attempting to combine history with biography in the case of one who, though conspicuous, was not a real director of the times. Apart from this the work deserves high praise as an elucidation of a period often misjudged. Several of Masson's essays have been collected under the title *Wordsworth, Shelley, Keats, and other Essays* (3 vols. 1874). His lectures on *British Novelists and their Styles* (1859) show excellent criticism. Besides other biographies he has prepared an accurate sketch of *Drummond of Hawthornden* (1873).

MATERIALISM is a term applied to those theories of philosophy which profess to find the final cause of phenomena in matter, or which reduce all phenomena to terms indicating its phases. The elementary impulses of philosophy were somewhat naturally in this direction, as in its beginnings philosophy occupied itself mainly with the phases of matter and had not yet awakened to subjective fields of research. So are the religions of savage peoples naturally materialistic, since the more striking forms of natural phenomena are readily apotheosized, and their power over human emotions is thus most readily accounted for. The Scylla and Charybdis of philosophy have been absolute idealism on the one hand and materialism on the other, and it is a noteworthy fact that the tendency of all philosophy, which fixes its beginnings in consciousness has been to end in the denial of the existence of matter; while all philosophy which begins in sensations, when pushed to logical conclusions, ends in the annihilation of mind and spirit, and naturally precludes all supernatural control of the universe.

The first development of systematic materialism was made by the Greek atomists. Of these Leucippus and Democritus were the leading spirits. They asserted that all matter was composed of atoms, which were primordial and eternal. These atoms, varying in weight, moved upon one another, the heavier falling and the lighter being displaced by these until, in obedience to the workings of a natural necessity, the worlds were made. The theory of Epicurus was substantially the same. He claimed that everything which exists has its natural causes, and he resented the intrusion of any supernatural agency whatever. That natural causes are sometimes hidden does not alter the fact of their constant and sufficient operation. Nothing, he claimed, can come from the non-existing, and nothing passes into non-existence. The philosophy of Epicurus was revived in modern times by the French philosopher, Pierre Gassendi (1592–1655). He ascribed to atoms force and even sensation. His materialism was not a doctrine of a dead nature like that of his master. On account of the relation which his philosophy bears to more modern investigations, it is regarded as of great historical importance, and F. A. Lange, whose work on *Materialism* is the ablest contribution to the literature of this subject, names him as the founder of the modern phase of this doctrine. He was followed in 1733 by La Mettrie, who having observed, during the progress of a fever by which he was afflicted, the effect upon thought of the accelerated or retarded movement of the blood, determined that all mental characteristics were directly traceable to physical conditions. His arguments and conclusions were adopted by Von Holbach in 1770, who pushed them to avowedly atheistic conclusions.

Unquestionably one of the greatest impulses given to any one form of modern philosophy, was started by Lord Bacon. He gave to the principle of induction the highest place and demanded empirical tests for knowledge. He did not reach the ends of his theories to which his friend and follower, Thomas Hobbes, afterward came. Hobbes regarded the mind itself as material, the phenomena of consciousness being the direct result of our organization. The one great and fundamental fact of mind is sensation, which he claimed as nothing less or more than the effect of our environments, or the impact of external matter on the other matter which we call mind. Imagination was the "decaying sense" of these original impressions. When associated with the past it was called memory. Imagination and memory are the same thing in a different tense only. All mental exercises and faculties were thus made to be mechanical processes of material origin. A somewhat remarkable development of materialistic philosophy was made by Priestley in England. Influenced by the philosophy of Locke, he followed the example of Hobbes in attributing to all our ideas a material quality. He thus developed a psychology which was essentially materialistic, but combined with his theories a belief in revealed religion. David Hartley wrote in a similar spirit. The anomalous attitude of these men had but few supporters. In more recent times Vogt, Moleschott, and Büchner have contributed largely to the materialistic literature of Germany. Büchner is perhaps the ablest materialist of all who approach the question from a metaphysical point of view. Ernest Haeckel (*q. v.*), accepting the theories of Charles Darwin, boldly avows the incompatibility of any faith in a supernatural power. He avows that "the terrible and ceaseless struggle for existence gives the real impulse to the blind course of this world. A 'moral ordering' and 'purposive plan' can only be visible if the prevalence of an immoral rule of the strongest and undesigned organization is ignored."

In England Charles R. Darwin, T. H. Huxley, John Tyndall, and Herbert Spencer have given powerful impulse to a prevailing form of materialism. These English writers have approached the investigation mainly from the side of physical science. The opinion of these writers generally is that matter contains "the promise and potency of every form and quality of life." As a result of careful and protracted research they present a theory of evolution according to which the higher orders of being have descended from lower and still lower forms, until we reach conditions of life which are hardly separable from inorganic matter. These changes are alleged to be the result of operations which have proceeded through an almost inconceivable space of time, and their nature has been determined by a process of "natural selection," and according to the law of the "survival of the fittest." Probably no philosophical theories have ever been published which have awakened greater attention than these, which differ from the earlier presentations of materialism in the fact that the earlier forms were developments of metaphysical investigation, while these latter are made to depend most largely upon alleged facts in physical science. It is equally true that none have been more vigorously assailed. Carlyle insists contemptuously that it is a "philosophy of dirt." Schopenhauer more philosophically contended that the axiom "'No object without subject' forever renders all materialism impossible." The hypotheses of materialism are met upon many grounds, chief of which are the following: 1. Materialism involves a confused notion of *force*. No physical change is explained in the mere outward phenomena which are presented—there is always an apprehension of cause or power apart from the physical elements, and this cause or power is spiritual in its nature. Morrell suggests, in illustration of this idea, that when we explain the tendency of two bodies to approach each other by referring it to the law of gravitation, we simply express our partial knowledge and our real ignorance, for a *law* can never move anything. The presence of an immaterial thing called force is recognized and remains unexplained. 2. Materialism involves the eternity of matter, and this is rendered at least doubtful by what we know of the conditional character of elements and atoms. 3. Materialism must remain a hypothesis incapable of proof so long as the problem of the origin of life continues. The most careful and protracted investigation has failed to produce any instance of spontaneous generation of life, and this fact gives a strong improbability of the conversion of inert matter into living forms. 4. The phenomena of mind. Our mental possessions are never the result of outward impressions merely, but depend equally upon certain subjective conditions which are not the result of perceptions. The mind itself, moreover, is claimed to be an invisible spiritual essence of such a nature that it is inconceivable that it should have been produced by the interaction of particles of matter. 5. The universe gives such evidence of intelligence and design that an intelligent creator is necessary to account for its existence and order.

For the literature of this subject consult the works of the authors above named, also F. C. C. Ludwig, Büchner, *Kraft und Stoff*, translated by J. F. Collingwood, under the title *Force and Matter* (London, 1864); a work which has been called the Bible of the German Materialists of our day; Ernest Haeckel, *Generelle Morphologie der Organismen* (Berlin, 1866); and *Natürliche Schöpfungsgeschichte* (1868); F. A. Lange, *Geschichte des Materialismus* (Iserlohn, 1866); and *Neue Beitrage zur Gesch. des Materialismus* (Winterthun, 1867); J. Andrews, *Psychology of Scepticism and Phenomenalism* (1874); W. B. Carpenter, *On Mind and Will in Nature* (1872); G. H. Lewes, *Matter and Force, Force and Cause Problems* (1875); W. Maccall, *The Newest Materialism* (London, 1876); J. M. Winn, *Materialism* (London, 1875); J. Tyndall, *Address at Belfast* (1875); St. G. Mivart, *Lessons from Nature, as Manifested in Mind and Matter* (1876); Duke of Argyll, *Reign of Law* (London, 1867); Reviewed in *Blackwood's Magazine* and in *Contemporary Review* (1867) by J. P. Mahaffy; Henry Drummond, *Natural Law in the Spiritual World* (1883); R. L. Dabney, *Sensualistic Philosophy of the Nineteenth Century Considered* (1876). (T. A. K. G.)

MATTHIAS, a religious impostor, whose real name was ROBERT MATTHEWS, was born in Washington co., N. Y., about 1790. He kept a country store, but having failed in 1816, removed to New York City, and thence to Albany in 1827. Under the influence of the revival-preaching of Rev. E. N. Kirk and Rev. C. G. Finney he became a temperance lecturer and street-preacher. Claiming to have a special revelation he undertook the conversion of Albany, and when he failed, prophesied the destruction of the city. He then went to New York, where he produced some sensation, and was supported by some respectable families. Finally he was tried on the charge of poisoning a wealthy disciple, and though acquitted, lost all his influence. He died some years later in Arkansas. See W. L. Stone's *Matthias and his Impostures* (1835).

MATTOON, a city of Illinois, in Coles county, is 172 miles by rail S. by W. of Chicago, and is at the crossing of 3 important railway lines. It is well-built, and has an opera-house, 2 large hotels, 2 national banks, 1 daily and 3 weekly newspapers, 10 churches, 2 flouring-mills, railway car-works and machine-shops, 2 grain-elevators, and manufactories of drain-tiles, castings and other goods, gas-works, a water-supply, and a public park. The property is valued at $4,500,000; public debt, $85,000. Mattoon was settled in 1855, incorporated in 1859, and made a city in 1867. The surrounding country is very fertile and well cultivated. Population in 1880, 5737.

MAUDSLEY, HENRY, an English physiologist, was born at Giggleswick, Yorkshire, Feb. 9, 1835. He studied medicine at University College, London, taking his degree in 1856. He was resident physician at the Manchester Lunatic Asylum from 1859 to 1862, and then removed to London as consulting physician in lunacy. He was for some years professor of medical jurisprudence in University College, London, and was Gulstonian lecturer to the Royal College of Physicians in 1870. He is editor of the *Journal of Mental Science*. His chief publications are *Physiology and Pathology of the Mind* (1867); *Body and Mind* (1870); *Responsibility in Mental Disease* (1874).

MAUREPAS, JEAN FRÉDÉRIC PHELYPEAUX, COMTE DE (1701–1781) a French statesman, was born at Versailles, July 9, 1701. He was grandson of the chancellor Pontchartrain, and at the age of 14 succeeded his father as minister of state, the office having belonged to his family for 170 years. The duties were discharged by a deputy until 1725, when he undertook them himself. Having charge of the city of Paris he did much of its embellishment. He also sent Maupertuis and others to measure an arc of the meridian in Lapland, while La Condamine and others were employed in similar work in Peru. On account of his writing a sarcastic epigram on Madame de Pompadour he was banished from the court in 1749. He was recalled in 1774, and became prime minister of Louis XVI. He gave favor to the independence of the United States, and summoned the long suspended parliament. His administration was however disastrous for France, owing to his frivolous character. He died at Paris, Nov. 21, 1781. The Abbé Soulaire published *Memoires du Comte de Maurepas* (1792), but these are considered spurious.

MAURER, KONRAD VON, a German archæologist, was born at Frankenthal in 1823, being son of the celebrated jurist, George Ludwig von Maurer (1791–1872), for whom see ENCYCLOPÆDIA BRITANNICA. He was educated at Munich, Leipsic, and Berlin, and in 1847 was made professor of jurisprudence at Heidelberg. He has devoted himself chiefly to the early Scandinavian history, laws, languages, and literature. He has published *Die Entstehung des isländischen Staats und seiner Verfassung* (1852); *Die Bekehrung des norwegischen Stammes zum Christenthum* (2 vols., 1855–56); and has edited *Gullthórissaga* (1858); and *Isländische Volkssagen* (1860).

MAUROCORDATOS, **ALEXANDER** (1791–1865), a Greek statesman, was born at Constantinople, Feb. 15, 1791, of a distinguished Fanariote family. At an early age he was secretary to his uncle, who was hospodar of Wallachia. After travels in Western Europe he returned to Greece in 1821 and took part in its struggle for independence. He presided in the first national assembly, and was afterwards distinguished as a general. When Otho was made king, Maurocordatos was several times prime minister, and also ambassador to Prussia, England, and France, holding the latter post 1850–54. He endeavored to introduce the ideas of Western Europe into the Greek administration. Towards the close of his life he lost his sight. He died at Ægina, Aug. 18, 1865.

MAY, **SAMUEL JOSEPH** (1797–1871), an American clergyman, was born at Boston, Mass., Sept. 12, 1797. He graduated at Harvard College in 1817, studied theology and was ordained in 1822, becoming pastor of a Unitarian Church at Brooklyn, Conn. He was one of the earliest advocates of the abolition of slavery. In 1833 he assisted in organizing the National Anti-slavery Society, and in 1835 he became general agent of the Massachusetts branch of this society, in which capacity he travelled and lectured extensively. In 1836 he settled as pastor of the Unitarian Church at South Scituate, Mass., and in 1842 he became principal of the Normal School at Lexington, Mass. In 1845 he became pastor of a church at Syracuse, N. Y., and held this position till 1868. He still continued his philanthropic labors, and was active in the cause of popular education. His advocacy of abolition was carried on at the risk of his life, and in January, 1861, he was mobbed and burned in effigy for trying to hold an abolition convention. During the civil war he was a zealous worker in behalf of the U. S. Sanitary Commission and of the Freedmen's Relief Associations. He died at Syracuse, N. Y., July 1, 1871. His principal work was *Recollections of the Anti-Slavery Conflict* (1868). His *Memoirs* were published by T. J. Mumford (1873).

MAY, **SIR THOMAS ERSKINE**, an English historian, was born at Bedford in 1815. He became assistant librarian of the House of Commons in 1831, and was called to the bar in 1838. He has held various positions in connection with the House of Commons, and in 1871 became its clerk. His works include a *Treatise on the Law, Privileges, Proceedings, and Usage of Parliament* (1844), and the *Rules, Orders and Forms of Proceeding of the House of Commons* (1854). He has published a *Constitutional History of England since the Accession of George III.* (3 vols., 1861–63), intended as a continuation of Hallam's *History*. His *Democracy in Europe* (2 vols., 1877) is a valuable contribution to history.

MAYAS. See ARCHÆOLOGY, AMERICAN, Vol. I., p. 280.

MAYER, **ALFRED MARSHALL**, an American physicist, was born at Baltimore, Nov. 13, 1836. He was educated at St. Mary's College, and became professor of physics in the University of Maryland in 1856. He afterwards held a similar position in Westminster College, Mo. (1859); Pennsylvania College, Gettysburg (1865); Lehigh University (1867); and in the Stevens Institute, Hoboken, N. J., since 1871. He studied for a year, 1863–64, at the University of Paris. His researches in astronomy, acoustics, and general physics have given him high rank in the scientific world.

MAYER, **BRANTZ** (1809–1879), an American author, was born at Baltimore, Sept. 27, 1809. His father, a native of Germany, was for many years a merchant in Baltimore, and consul-general for Würtemberg. Brantz graduated at St. Mary's College, Baltimore, and after visiting the East Indies, settled down to the practice of law. In 1841 he went to Mexico as secretary of legation, and after his return was editor of the *Baltimore American*. In 1867 he was appointed paymaster in the army, which post he resigned in 1875. He died at Baltimore, Feb. 23, 1879. He published numerous books, among which are *Mexico as it Was and as it Is* (1844); *History of the War with Mexico* (1848); *Mexico: Aztec, Spanish, and Republican* (1852); *Calvert and Penn* (1852); *Captain Canot* (1854); *Mexican Antiquities* (1871); and *Baltimore as it Was and as it Is* (1871).

MAYHEW, an American family, noted in the colonial history of Massachusetts. It was founded by **THOMAS MAYHEW** (1592–1682), who was originally a merchant at Southampton, England, but obtained in 1641 a grant of a large part of Martha's Vineyard, with the title of governor. He planted a colony there in 1642, and labored effectually for the conversion of the Indians of the island, who always remained firm in their friendship for the whites.

EXPERIENCE MAYHEW (1673–1758), great grandson of Gov. Thomas, was born Jan. 27, 1673, and ministered to the Indians of Martha's Vineyard, as his ancestors had done. He translated the Psalms and the Gospel of John into their language, and published *Indian Converts* (1727), and *Grace Defended* (1744). He died Nov. 29, 1758.

JONATHAN MAYHEW (1720–1766), son of the preceding, was born Oct. 8, 1720. He graduated at Harvard College in 1744, and was ordained pastor of the West Church, Boston, in 1747. He inclined to Unitarian views, and in the political agitation of the time was a supporter of the rights of the colonies. He was much esteemed for ability as a preacher and a controversialist. His opposition to the introduction of bishops into the American colonies led to a noted controversy with Dr. Apthorp and Archbishop Secker. He died at Boston, July 9, 1766. His *Writings* were edited with a memoir by Alden Bradford (1838). His brother, **ZACHARIAH**, was missionary in Martha's Vineyard from 1767 till his death, March 6, 1806.

MAYO, **AMORY DWIGHT**, an American author, was born at Warwick, Mass., Jan. 31, 1823. He was educated at Amherst College, and studied theology with Dr. Hosea Ballou. He was ordained, in 1846, pastor of the Independent Christian Church. In 1854 he removed to Cleveland, Ohio, in 1856 to Albany, in 1863 to Cincinnati, and in 1872 to Springfield, Mass., having charge of churches in each place. He was also active in the cause of public education, being a member of the school-board at Cincinnati and at Springfield. Since 1880 he has been an editor of the *Journal of Education*, and since 1883 has been agent of the Peabody fund for the promotion of education in the Southern States. He has published *The Balance* (1847); *Graces and Powers of the Christian Life* (1852); *Symbols of the Capital* (1859); *Religion in the Common Schools* (1869). He has also edited the writings of his wife, Mrs. S. C. Mayo, with a memoir (1849).

MAYO, **WILLIAM STARBUCK**, an American author, was born at Ogdensburg, N. Y., April 20, 1812. He is descended from Rev. John Mayo, first pastor of the North Church, Boston, from 1622 to 1655. He graduated in medicine at the College of Physicians and Surgeons, New York City, in 1833. After some years' practice he visited Spain for his health, and travelled through the Barbary States. He has published *Kaloolah* (1849), narrating imaginary adventures in Africa; *The Berber* (1850), a similar tale; *Romance*

Dust from the Historic Places (1851); *Never Again* (1873).

MAYSVILLE, a city of Kentucky, county-seat of Mason county, is on the Ohio River, 60 miles above Cincinnati, and opposite Aberdeen, Ohio. A railway connects it with Lexington, Ky. The town is handsomely situated, and a range of picturesque hills bounds its site to the S. It has city and county buildings, many churches, a national bank, 3 weekly newspapers, manufactures of flour, spirits, farm-implements, lumber, railway cars, etc. Hemp, tobacco, provisions, and other farm-products are extensively marketed here. The population in 1880 was 5220.

MEAD, Larkin Goldsmith, an American sculptor, was born at Chesterfield, N. H., Jan. 3, 1835. He spent his childhood at Brattleboro', Vt., and studied sculpture with H. K. Brown at Brooklyn, N. Y. His first work was the Recording Angel (1855), and soon after he produced the colossal statue of Vermont for the State-house at Montpelier. While serving in the army in 1861 he sent graphic sketches of camp and battle-field to a New York illustrated paper. In 1862 he went to Florence, Italy, and in 1865 exhibited at New York the Returned Soldier, Echo, La Contadinella, and other works. He executed the statue of Lincoln for the monument at Springfield, Ill., and the statue of Ethan Allen in the Capitol at Washington. These statues are noted for their faithful presentation of features and life-like attitudes.

MEADE, George Gordon (1815–1872), an American general, was born at Cadiz, Spain, Dec. 30, 1815, his father, Richard W. Meade, being at that time U. S. navy agent there. His grandfather, George Meade, a wealthy merchant of Philadelphia, had contributed liberally for the support of the Revolutionary army. The grandson graduated at West Point in 1835, and entered the artillery service. He was employed in the war against the hostile Seminoles, but resigned in October, 1836, and became a civil engineer. He was engaged in a survey of the mouths of the Mississippi, and afterwards on the boundary line of Texas, and on that of Maine. In 1842 he re-entered the army as second lieutenant of topographical engineers, and during the Mexican war he served with distinction on the staffs of Gens. Taylor and Scott. He was afterwards employed in light-house construction, and on the geodetic survey of the great lakes. In August, 1861, he was appointed brigadier-general of volunteers, and commanded the second brigade of the Pennsylvania Reserve Corps. In McClellan's Peninsular campaign, Meade fought at Mechanicsville, Gaines' Mills, and Glendale, being severely wounded at the latter. He afterwards commanded a division at Antietam, and when Gen. Hooker was wounded there, succeeded temporarily to the command of the First corps of the Army of the Potomac. In December, 1862, Meade, now major-general, led the attack which broke through the right of Lee's line at Fredericksburg, but not being supported, was obliged to fall back. He was placed in command of the Fifth corps, and though much esteemed by Gen. Hooker, was not called into action at Chancellorsville. On June 28, 1863, after Lee had crossed the Potomac on his way to Pennsylvania, Pres. Lincoln placed Gen. Meade in chief command of the Army of the Potomac, then hastening to the field of Gettysburg (*q. v.*). After three days of severe fighting the Confederate army, under its ablest leader, was driven back by Gen. Meade's skill, directing the valor of that army with which he had been identified. For this victory he was made a brigadier-general in the regular army. His neglect to reap the full fruits of his victory by capturing Lee's army has been blamed. In the spring of 1864 Lieut.-Gen. Grant, being placed in command of all the Union armies, entered the field with the Army of the Potomac. Gen. Meade however still retained the immediate command of this army till the close of the war, discharging the duties of his difficult and delicate position to the entire satisfaction of Gen. Grant. In the bloody battles of the Wilderness and the subsequent campaign, the Army of the Potomac suffered severely. In June, 1864, it was transferred to the south side of the James in order to capture Petersburg, the main defence of Richmond on that side, but Gen. Lee saved the place by prompt reinforcements. The siege lasted ten months, and at its close Richmond had to be evacuated, and Gen. Lee surrendered April 9, 1865. After the war Gen. Meade had command of the military division of the Atlantic until August, 1866, when he took command of the department of the East. He afterwards had command of the military district comprising Georgia, Florida, and Alabama, with his head-quarters at Philadelphia. He died there, Nov. 6, 1872. His fellow-citizens of Philadelphia had presented him with a house, and after his death raised a fund of $100,000 for his family.

MEADE, Richard Worsam (1807–1870), an American naval officer, brother of the preceding, was born at Cadiz in 1807. He entered the navy in 1826 and rose to the rank of commander at the outbreak of the civil war. In 1864 he had command of the steam sloop-of-war San Jacinto, and on its loss was retired with the rank of captain. He was eccentric in his habits. He died April 16, 1870.

His son, Richard Worsam Meade, born at New York Oct. 9, 1836, entered the navy as midshipman in 1850, and was made lieutenant-commander soon after the commencement of the civil war. He was employed on the Mississippi River and on the South-Atlantic and West-Gulf blockading squadrons.

MEADE, William (1789–1862), an American bishop, was born in Frederick (now Clarke) co., Va., Nov. 11, 1789. He was a son of Col. Richard Kidder Meade, one of Washington's confidential aides. He graduated at Princeton College in 1808, and was ordained to the Protestant Episcopal ministry in 1811. His wealth enabled him to minister freely to churches near his home and to contribute to the establishment of a theological seminary at Alexandria. In 1829 he was chosen assistant bishop of Virginia, and in 1841, on the death of Bishop R. C. Moore, became bishop. For many years he was the head of the evangelical party in the Episcopal Church of the United States. He opposed the secession movement of 1861. He died at Millwood, Clarke co., Va., March 14, 1862. His best known work is *Old Churches, Ministers, and Families in Virginia* (2 vols., 1856). His *Life* (1868) was written by Bishop John Johns, his assistant and successor.

His brother, Richard Kidder Meade, (1795–1862), was a lawyer and Democratic member of Congress 1847–53, then chargé d' affaires to Sardinia, 1853–57, and minister to Brazil, 1857–61. Returning to the United States he supported the secession movement, and died in April, 1862.

MEADVILLE, a city of Pennsylvania, county-seat of Crawford county, is on French Creek, 100 miles N. of Pittsburg. It has a handsome court-house, a high-school, many fine churches, commodious public school-buildings, several newspapers, a public library, 2 national- and 2 savings-banks, extensive railway-shops, and is the seat of Allegheny College (*q. v.* in Vol. I.) and of a Unitarian Theological Seminary. The city is situated at a railway-junction and is the chief business centre of a fertile and prosperous region. The manufactures are extensive and varied. Among the goods produced are woollens, machinery, farm-implements, carriages, glass, and paper. Meadville was settled in 1789 and chartered as a city in 1866. The population in 1870 was 7103; in 1880, 8860.

MEAGHER, Thomas Francis (1823–1867), an Irish-American general, was born at Waterford, Ireland, Aug. 3, 1823. He was educated at Stonyhurst College, England, studied law and was early noted for his oratorical ability. He took part in the Young Ireland movement and in 1848 was seized and tried for high treason. He was sentenced to death, but the sentence was commuted to transportation for life to Tasmania. Hence he escaped and arrived at New York in May, 1852. He spent two years in lecturing in the principal cities on Irish independence, and afterwards established the *Irish News*. In 1861 he assisted in raising the 69th New York regiment and fought with it at Bull Run. Having organized the Irish brigade, he was made brigadier-general of volunteers Feb. 3, 1862. He fought in the principal battles of the Army of the Potomac and was wounded at Fredericksburg. In May, 1863, he resigned, but in 1864 he was recalled and assigned to the command of the district of Etowah. In 1865 he was made secretary of Montana, and in September, 1866, became acting governor. While travelling he fell from the deck of a steamboat and was drowned in the Missouri near Fort Benton, Montana, July 1, 1867. He published a volume of *Speeches* (1853) and a narrative of his regiment's experience in Virginia (1861).

See Vol. XV. p. 663 Am. ed. (p. 657 Edin. ed.).

MEASLES (*Rubeola; Morbilli*). This species of fever is a disease of childhood in cities and towns owing to its great contagiousness. In the country many escape it until adult life and are then affected with increased severity. The disease is taken from the breath of those affected, and may be communicated by inoculation of the nasal mucus, but without advantage. After a latent period of about 14 days the attack commences with fever and catarrh of the respiratory mucous surfaces. A darkish-red eruption, somewhat elevated in crescentic lines, appears on the fourth day without decline of fever. The eyes become red, weak, and watery. By extension of the catarrh to the frontal sinuses, a dull headache is produced. Descent of the catarrhal affection into the alimentary canal results in diarrhœa or dysentery; and pneumonia occasionally follows its extension into the lungs. The rash culminates on the second or third day and then progressively declines together with the fever and catarrh. In some cases, especially those not well protected from cold, invasion of the pulmonary and intestinal tracts renders the disease protracted and dangerous; otherwise it usually terminates within 10 days, with a period of debility lasting some weeks longer. The most important part of treatment consists in careful protection of the sensitive cutaneous and mucous surfaces from cold, which seriously aggravates the catarrhal affection.

ROSEOLA (*Rötheln*) is a trivial disorder strongly resembling measles in eruption, fever, and catarrh, and is sometimes mistaken for a mild type of that disease; but their distinctive character is proved by the fact that an attack of one is not protective against the other. (See FEVERS.) (S. S. H.)

MEATS. The production, preparation, transportation, and consumption of meats is a subject of special American interest, since the meat product of this country is growing to be one of its most important industries. A brief extract from the U. S. census report for 1880 will show the high value of this industry. On July 1, 1880, the total stock of horned cattle in the United States was 39,675,533 head. Of these the great majority were upon farms, the estimated number on ranches and ranges in the grazing States and Territories being 3,750,022. The sheep and hog product was yet greater in numbers, though of course much inferior in value, the number of sheep being 42,192,074, of which 7,000,000 were on grazing ranches, and of hogs 49,772,670, of which 2,090,970 were on ranches. The farm supply is thus enormously in excess of the stock in the great grazing regions of the West, yet the latter is of special value as forming an excess stock for the supply of foreign markets, and from the fact that this Western stock is susceptible of a great increase. It has indeed been calculated that if cattle raising in the United States should suddenly cease the cattle supply of the world would be totally exhausted in five years. Under these circumstances the increase of food animals in America is of interest to the whole civilized world. Cattle-raising in the United States has always displayed its two existing forms, the growing of stock in the enclosed pasture-fields of farms, and on the open grazing regions beyond the cultivated area. The advance of agriculture has gradually pushed this grazing region westward, until now it has reached its final locality in the vast plains of the region east of the Rocky Mountains, a country whose small rain-fall must place a fixed limit to the invasions of agriculture.

Grazing as a special occupation distinct from agriculture has been long carried on in Northern Spanish America. It gained its first decided impulse when Texas and the other northerly regions of Spanish America fell into the hands of the United States. Since the era of the civil war it has been enormously developed, the advance of the railroad system rendering a great increase of product practicable. The Great American Desert of former geographers proves to be the largest and richest pasture-region of the world, a vast area of 1,650,000 square miles in extent, very little of which is suited to agriculture, and which must soon become the most important beef-producing country on the globe. It is covered thinly with grasses, of high nutritive value. (See FORAGE CROPS.) The buffalo grass, which once fed the immense herds of bisons that ranged at will over this vast area, retains its nutritive qualities through the winter, as is not the case with the more succulent grasses of the East. Grazing on the dried grass can continue all winter, a circumstance of the utmost importance to the Western stock-raisers.

As yet the greatest grazing region is that of the State of Texas, where there are 139,000,000 acres occupied by live-stock. These Texan cattle are the descendants of the old Spanish stock, and are very inferior to the modern improved breeds. They are marked by long horns and legs, large but thin bodies, and yield inferior meat, the cheapest in the market. In 1880 the cattle of Texas numbered 4,894,698, of which more than 4,000,000 were on farms, the remainder being on ranges. Previous to 1873 stock was permitted to roam at will. But the advance of agriculture has forced the cattle-men to fence in their ranges. The northern grazing region consists of the eastern district of Colorado and the western portions of Kansas and Nebraska, together with much of the Indian Territory and of the other Territories. This vast area has been mainly stocked with Texas cattle, large droves of which are sent North annually. It is said that 200,000 cattle were driven into Colorado in 1885, and that the stock on the grazing plains of this State has increased from 300,000 in 1870 to over 2,000,000 in 1885. The increase in the number of sheep is equally marked. There are comparatively few swine in this more westerly region, but they are kept in immense numbers in Kansas and Nebraska.

During late years there has been an active effort to improve the quality of the cattle-stock of the West. The Texan breed has been crossed on the northern ranges with other varieties considerably to its improvement, and these improved grades have recently been crossed with Durham, Hereford, and other blooded stock from the East, with a very marked increase in the value of the product. In the more northerly portion of the grazing region the snow-fall is occasionally crusted with ice, and many cattle die from inability to reach the grass. But this is a disaster of infrequent occurrence. Ordinarily there is no hinderance to grazing throughout the winter. The improvement in the quality of American cattle is strikingly indicated by its advance in price, which has been considerable of recent years. In 1871 the average price per head of exported cattle was $19.65; in 1885 it was over $94. A similar advance has taken place in the price of sheep. The exportation of live cattle for food purposes first became an established industry in 1876. Cattle were exported earlier, but mainly for breeding purposes. For comparison, the statistics of exportation of several years are given:

	1871.	1880.	1884.	1885.
Live cattle	20,530	182,756	190,618	135,890
" sheep	45,465	209,137	308,675	234,509
" swine	8,770	83,444	46,382	54,965

The number of live animals exported has been considerably influenced by the exportation of fresh and preserved meats, which has immensely developed within the last ten years. The first shipments of fresh beef to England were made in the autumn of 1875 as an experiment. It proved so successful, and the low price of the meat opened for it such a market in England, that the enterprise has grown into an enormous industry. It was rendered possible by the refrigerating process employed in America. Immediately after killing the animal, the meat is exposed to a temperature of 38°, being 6° above the freezing point. This rapidly extracts the animal heat, and closes the pores, rendering the meat less susceptible to heat and taint than that freshly killed and cooled at ordinary temperatures. Actual freezing, on the other hand, is positively injurious, the meats thus treated rapidly decomposing in ordinary temperatures. Thus prepared, the meats are sent across the continent in refrigerating cars, and across the ocean in steamers prepared with special refrigerating receptacles, in which a fan-blower keeps the inside air cooled to 38° temperature, in constant circulation around the meat. It continues bright and fresh in appearance, and is said to keep longer in a fresh state after reaching England than freshly killed English beef. The statistics of this exportation, both of fresh and cured meats, are of interest. The first year in which fresh beef was actively exported was 1876. The exportation of fresh mutton began in 1877. The following table shows these two items for a few successive years, and some other meat products for the fiscal year of 1885 only:

	1877. Pounds.	1880. Pounds.	1885. Pounds.
Fresh beef	49,210,990	84,717,194	115,780,874
Fresh mutton	349,368	2,335,858	3,555,660
Canned beef			421,478
Cured beef			49,317,955
Pork products			482,200,697
Lard			283,214,339

The value of these several items for 1885 is given as follows:

Fresh beef	$11,199,481
Cured beef	3,658,401
Canned beef	4,214,781
Fresh mutton	266,387
Pork products	37,394,734
Lard	22,333,704
Live animals	13,998,441
Total	$93,065,929

Of the food animals killed in the United States for exportation and home consumption the swine product stands considerably at the head in quantity and value, and has long been of national importance. Much the largest percentage of the pork-packing industry was formerly confined to the Western States, the hogs killed in the East being principally for immediate use. It was mainly limited to the cities of Cincinnati, Chicago, St. Louis, Indianapolis, Milwaukee, and Louisville. Of these cities Cincinnati originally took the lead, and long continued the great pork-producing centre of the United States. This still continues the most important industry of that city, though its output of pork was reached by Chicago in 1863, and has since been very much surpassed.

More recently the centres of the pork-packing industry have changed to some extent, and northern New Jersey, from its proximity to New York city, has risen into importance.

In 1880 the hogs slaughtered in the United States reached the grand total of 16,098,428, valued at $158,680,844, their average weight being 248 lbs. The principal packing States were:

Illinois	5,745,263 head.
Ohio	1,434,179 "
New Jersey	1,426,560 "
Missouri	1,138,068 "

The pork industry is one of extraordinary importance, the value of the annual hog crop being more than three-fifths that of our total meat product. Second in importance is the cattle industry. We have already given the exportation figures. Heavy as these are, the total consumption is very considerably greater. The average consumption of meat in the United States is larger than that of any other civilized country in the world. It is computed at 120 lbs. per inhabitant per annum. That of Great Britain is computed at 105 lbs., while the several Continental nations of Europe range from 76 lbs. down to a much lower figure. The beeves slaughtered in the United States in 1880 numbered 1,755,533, valued at $71,333,182; average weight, 1100 lbs. The great centre of this industry was Chicago, though large abattoirs are now erected in all our large cities. Thus, while the total for Illinois was 595,274 head, New York reached a total of 437,743. The methods employed in killing and dressing this great number of cattle are skilful, rapid, and systematic. As a trade, butchering has reached perfection in the great abattoirs of the country.

The centres of the sheep-killing industry differ somewhat from the cattle and swine centres. The total sheep slaughter in 1880 was 2,233,701 head, worth $8,957,727, the average weight being 92 lbs. The principal centres of this industry were New York, 766,141; New Jersey, 324,750; California, 414,185; and Massachusetts, 358,689. The value of all animals slaughtered in the census year, including poultry, etc., was $256,738,905.

The following table shows the finished product of the meat industry for 1880, so far as cattle, sheep, and swine are concerned, as follows:

Beef sold, fresh	759,142,875 lbs.
Beef, canned	101,371,199 "
Beef, salted or canned	90,763,466 "
Mutton, fresh	106,692,216 "
Pork, fresh	506,077,052 "
Pork, salted	859,045,987 "
Bacon and hams	1,122,742,816 "
Lard	501,471,698 "
Total value of all products	$303,562,413

Of this total product nearly one-third is credited to Illinois. The additional sources of meat in America, such as poultry, game animals, etc., though considerable in amount, are of minor importance as compared with the figures given above. The wild birds and quadrupeds of the country, once a highly important source of food, have lost their value in this respect and have been very largely supplanted by domesticated animals. The most striking instance of this is found in the bison, which once ranged the whole country, then became confined to the prairie region of the West, and has now almost disappeared, its former vast herds being supplanted by the grazing cattle of the Western plains. Domestic fowls yield a large and valuable addition to the food-supply of the country, and the egg industry is one of considerable importance. Yet these sources of food are of comparative insignificance as compared with the vast product of beef, pork, and mutton.

Another subject of interest and importance in this discussion is that of the methods adopted for the preservation of meat, in addition to the processes mentioned of pickling and salting, and of refrigeration. The latter is an expensive process, and cannot be continued beyond a limited period without adding greatly to the cost of the material. But other methods of keeping meat in a fresh state at a low cost and for indefinite periods have been devised.

The first of these processes is that known as the Liebig beef extract method, adopted many years ago for the preservation of the vast stores of meat annually wasted on the South American cattle ranges, where beeves were killed in great numbers for their hides alone, there being no market for the meat. This extract is now of minor importance, being in liquid form and containing only a portion of the nutritive elements of the meat. The dried, or "jerked" meat, which formed one of the former preservative processes, is now imitated on a larger scale and by improved methods. After removal of the bone, fat, and gristle, the beef is cut into extremely thin slices, which are thoroughly dried by a steam-evaporating process. It is said to retain its good qualities indefinitely, there being nothing left to induce decay. One-quarter pound is equal to a pound of solid meat.

Another important process, which is still to some extent in the stage of experimentation, is that of the use of antiseptic chemical liquids. Of the several substances applicable boracic acid is much the best, being tasteless and inodorous and producing no alteration in the taste, appearance, or other properties of the meat. Prof. Barff has made a compound of boracic acid and glycerine, freely soluble in warm water and antiseptic. It is said that meat, oysters, poultry, etc., after immersion in this solution, will keep for months without a trace of decomposition. Milk and soup may be preserved by mixture with the solution. They acquire thereby no foreign flavor. The solution, of which a gallon costs 15 to 20 cents, may be repeatedly used. In England the experiment has been successfully tried of injecting the veins of a sheep with this solution. The meat thus treated remained fresh without the use of ice for two or three weeks in the summer and for as many months in the winter.

But the most commercially important of the processes as yet devised is that of canning, which has of late years grown into a highly valuable industry. Beef-canning has been for a considerable period practised in Australia and the product exported to England. But the American process, as actively pursued in Chicago for some ten years past, is superior and its product commands a higher price in the English market. The Australian meat is packed in the cans cold and afterwards exposed to a boiling heat. In the Chicago process it is packed hot. For the purpose of canning only first quality beef is selected. After slaughter the bones, sinews, and gristle of the meat are removed and the product again inspected. The selected portions are cut into small pieces and placed in large wooden vats, where they are exposed to steam-heat. They are then packed in strong tin cans, to the weight of 2, 4, 6, and 14 pounds each. These cans are then hermetically sealed. The meat thus prepared will keep fresh for an indefinite period, and a very large export trade for it has sprung up, as indicated by the statistics already given. There is a considerable industry also in the canning of corned beef and beef tongues. For this purpose only the best material is used, all inferior being discarded. For canning purposes several thousand cattle are killed weekly.

Of the live cattle and fresh beef and mutton exported from the United States to Europe nearly the whole goes to England. Of the canned meat England receives about three-fourths the total export. Pork products find a large market in France and Germany, and in other parts of Europe. Several efforts have been made in recent years to obstruct the exportation of American meats by European governments, but in vain. The question of cheap food is too important a one to European populations to permit governmental obstruction to remain long operative. (C. M.)

MEDICAL COLLEGES OF AMERICA. Previous to the Revolutionary war medical education in this country had scarcely begun, and there were very few graduates from American colleges. In 1776 there were from 3000 to 3500 medical practitioners in America, to a population of about 3,000,000. Of these probably not more than 400 had received the degree of M. D., and most of these had been educated in Europe. Only 2 medical colleges had been organized, one in Philadelphia and one in New York, and only 51 medical degrees had been conferred by these when the outbreak of the war checked further progress. In that era the medical profession was so little lucrative that it was usually associated with some other. In the New England colonies the minister of the town often officiated as physician. In all the colonies it was common for the doctor to eke out a livelihood by the practice of agriculture, or by some trade or business. Of medical societies three existed: the Medical Society of New Jersey (1766); the Philadelphia Medical Society (1765); and the Delaware State Medical Society (1776). There was only one permanent hospital, the Pennsylvania Hospital (1752). The library of the latter was begun in 1763. The credit of delivering the first public lectures to a class in anatomy, illustrated by dissections, is usually given to Dr. William Hunter, of Newport, R. I. (1752–55). It is certain, however, that Dr. Thomas Cadwallader gave anatomical instruction in Philadelphia from 1745 to 1751, though most probably he did not employ dissection as an aid to his lectures. Various other doctors gave private lecture courses, such as Drs. Edward Shippen and John Morgan, of Philadelphia, and John Bard and Peter Middleton, of New York.

The first medical college of America was founded at Philadelphia in 1765. The College of Philadelphia had been established in 1749. In 1765 a medical school was added, the first professor chosen being Dr. John Morgan on May 3, 1765. He filled the chair of theory and practice of medicine. On Sept. 23 of that year Dr. William Shippen was made professor of anatomy and surgery. These were the first American professors of medicine, and they fulfilled all the duties of the college till 1768, when Dr. Adam Kuhn was made professor of materia medica and botany, and Dr. Benjamin Rush of chemistry. These, with Dr. Thomas Bond, clinical teacher at the Pennsylvania Hospital, completed the organization and composed the faculty. They were all, with the exception of Dr. Bond, graduates of the medical department of the University of Edinburgh. The first medical degree conferred was that of bachelor of medicine on 10 young men at the commencement of June 21, 1768. The degree of doctor of medicine was first conferred by this school in June, 1771, on 4 of the bachelors of 1768. The courses of lectures continued till 1777, when they were brought to an end by the British occupation of Philadelphia. At a later date the charter of the college was abrogated by the legislature, and its property removed to a new institution, the University of Pennsylvania. In 1789, through the influence of Benjamin Franklin, the charter of the college was restored, and it resumed operations side by side with the university. In the term of 1790–91 there were 104 students, about equally divided between these two institutions. In 1791 an act was passed combining the two schools, under the title of the University of Pennsylvania. Dr. John Ewing was elected provost, and all the professors of the two schools were elected professors in the new one. The degree of bachelor of medicine was not conferred after that date. We have described this institution in some detail from its importance as the first medical school of America, and from the fact that it has served as a model of all subsequent institutions.

The second medical school of the country was that organized as a department of King's (now Columbia) College of New York, in 1768. The original faculty of this institution was: Dr. Samuel Classy, anatomy; John Jones, surgery; Peter Middleton, physic and surgery; James Smith, chemistry and materia medica; John Tennant, midwifery; and

Samuel Bard, theory and practice of medicine. The first course of lectures was delivered in the autumn and winter of 1768–69, and the degree of doctor of medicine conferred on one or two graduates in 1770. This school did not flourish. It was reorganized in 1792, and existed till 1810. In 1787 a free dispensary was opened, accompanied with medical lectures, which drew more students than the college. After the Revolutionary war the subject of medical education began to attract attention in New England, and in 1782 a course of anatomical lectures was delivered in Harvard College. In the next year a regular medical faculty was organized in this institution. This department of the college was removed to Boston in 1810, where it has since continued the leading medical college of the Eastern States. In 1797 a medical department was organized in Dartmouth College, N. H. In 1807 the College of Physicians and Surgeons was chartered in New York city. Its first lectures were given in the winter of 1807–08 to a class of 53 students. In 1810 the medical department of Columbia College was discontinued, leaving this new school the only one in the State of New York, with a class, that year, of 82. Its faculty consisted of Drs. Samuel Bard, David Hosack, William J. McNeven, Samuel L. Mitchill, Valentine Mott, John W. Francis, and Wright Post. The rapid progress expected of this new institution was not realized. There were jealousies and dissensions between the faculty and the large board of trustees which impeded its work and the progress of medical education. The medical department of the University of Maryland, at Baltimore, was incorporated in 1807. This met with fair success, and is now among the leading colleges of the country.

By the year 1810 there had been organized 7 medical colleges in all, 2 in Philadelphia, 2 in New York, 1 in Boston, 1 in Hanover, N. H., and 1 in Baltimore. Of these 1 each in Philadelphia and New York had disappeared, so that but 5 continued to exist. These had an aggregate class of 650 students, of whom about 100 received degrees in that year. Two-thirds of this whole number graduated from the University of Pennsylvania, which was, by all odds, at that time, the most important medical school of the country. Its faculty at that date consisted of 8 professors. There were then only 3 general hospitals in existence, respectively at New York, Philadelphia, and the Charity hospital at New Orleans, so that elsewhere the opportunities for clinical instruction was greatly restricted. The New York hospital had been organized in 1767, but did not commence operations till 1791. Students were required to study two years with a practicing physician before entering college, and to attend one year's course for the degree of bachelor of medicine, three years for that of doctor of medicine.

After 1810 medical schools were opened with some rapidity, in the various sections of the country. In that year a medical department was added to Yale College, lectures beginning three years afterwards. In 1812 the College of Physicians and Surgeons of the Western District of New York was opened at Fairfield, Herkimer county. This ceased to exist in 1840, when colleges were opened in Albany and Geneva. In 1818 the Vermont academy of medicine opened at Castleton, Vt. It ceased to exist in 1854. In 1817 the medical school of Lexington, Ky., opened, continuing in existence for 25 years. The Medical College of Ohio was organized at Cincinnati in 1819. The medical department of Bowdoin College, Maine, was organized in 1820, and, like the similar departments at Dartmouth and Yale, has continued successful. Of the many other medical schools that have been since the above dates organized in various parts of the country the following deserve particular mention : the Jefferson Medical College, of Philadelphia, organized in 1825, its original faculty consisting of Drs. John Eberle, George McClellan, Nathaniel R. Smith, F. S. Beattie, B. Bush Rhees, and Jacob Green. Its first class consisted of 110 students. In the session of 1835–36, ten years later, it had 364 students. It is at the present time in the front rank of American colleges. Another college which has attained a prominent position is the Bellevue Hospital Medical College, New York, organized in 1861. The other most prominent colleges are : the College of Physicians and Surgeons, Baltimore (1872); the Rush Medical College, Chicago (1843) ; the medical departments of University of Louisville (1837) and of Louisiana (1834) ; the Missouri Medical College, St. Louis (1840) ; the medical department of the University of the City of New York (1841) ; and the medical department of the University of Virginia (1825). Up to 1876 (as stated by Dr. Davis in his *History of Medical Instruction in America*, to which we are indebted for most of the above particulars) there had been in all 80 colleges of the regular school of medicine organized. Of these 16 were discontinued or suspended, leaving 64 in operation at that date. Of these four were devoted exclusively to the medical education of women, comprising the Woman's Medical College of Pennsylvania (1850) ; the Woman's Medical College of the New York Infirmary (1864) ; the Woman's Hospital Medical College, Chicago (1870) ; and the Free Medical College for Women, New York (1871). There have been several others organized since the above date. The whole number of medical students in 1810 was about 650, with 100 graduates. In 1840 it had increased to about 2500, with 800 graduates. In 1876 it was about 6650 with 2200 graduates, the whole number of professors being then about 500. This ratio of increase of graduates is nearly equal to that of the increase of population, so that, judging from this, there would seem to be no undue crowding of the profession.

In 1884 the number of regular schools in active operation had increased to 88, with 1500 professors, 10,600 students, and 3409 graduates. To this we may add 9 colleges of Eclectic and 13 of Homœopathic medicine, 18 Dental and 17 Pharmaceutical colleges, making a total of 145 as returned to the commissioner of education. In 1885 the total number of professors was 2235 ; of students, 15,300 ; and of graduates, 4617. The more flourishing or otherwise notable of these schools, with their dates of institution, number of professors, and of graduates, were as follows :

Medical Colleges.	Date of Founding.	Professors.	Graduates.
Rush Medical College, Chicago	1843	37	166
Medical Dep't of University of Louisville	1837	13	84
College of Physicians and Surgeons, Baltimore	1872	10	127
School of Medicine of University of Maryland	1807	19	74
Woman's Medical College of Baltimore	1882	17	5
Harvard Medical School, Boston	1782	52	59
Medical Department of University of Virginia	1825	5	14
Missouri Medical College, St. Louis	1840	18	103
Bellevue Hospital Medical College, New York	1861	28	149
College of Physicians and Surgeons, New York	1807	53	115
Medical Dep't University of City of New York.	1841	27	213
Woman's Medical College of N. Y. Infirmary.	1868	20	9
Cincinnati College of Medicine and Surgery	1851	14	14
Medical College of Ohio	1819	13	100
Jefferson Medical College, Philadelphia	1825	19	215
Medical Dep't of University of Pennsylvania.	1765	53	101
Woman's Medical College of Pennsylvania	1850	15	26
Woman's Medical College of Chicago	1870	28	21

The subject of the medical education of women is one of sufficient importance to demand some special attention, It has been pursued against the greatest discouragements and difficulties, and has attained its present assured position only through the indomitable perseverance of its corps of resolute pioneers. Philadelphia, the seat of the first medical college in the United States, was also that of the first Woman's College. There had been previously formed at Boston a "Female Medical Educational Society," which in 1852 received a charter for the education of "midwives, nurses, and female physicians," and in 1856 was chartered as the "New England Female Medical College." The futility of the efforts of the progressive women of Philadelphia to obtain a medical education in the existing colleges had previously led to the opening of a woman's college in that city, which was chartered on March 11, 1850, and opened in the autumn of that year under somewhat favorable auspices and with a full corps of professors, under the title of "The Female (now Woman's) Medical College of Pennsylvania." It occupied a building in the rear of 627 Arch Street, which had been previously occupied by the pioneer homœopathic college of the country. For a long period this institution struggled with great difficulties. The persistent opposition of medical men, the lack of means, and the meagre facilities for clinical study hindered its progress, and instigated a strenuous effort among women students for admission to the older colleges. Some have gained such admission, but their position has been anything but an agreeable one. With the doors of all hospitals closed against them the early graduates of the Woman's College obtained clinical advantages with the greatest difficulty. Some found the desired opportunity in Boston, and some in New York, where the New York Infirmary was opened as a dispensary in 1854, and as a hospital in 1857, but it was found impossible for a woman to gain admittance, as a medical student, to any Philadelphia hospital. This difficulty led to the establishment of the Woman's Hospital which went into operation in October, 1861. Since that period the progress of the medical education of women has been steady and encouraging. The obstructions in the way of admission to hospital practice have gradually given way until now all the important hospitals in the city are freely opened and every opportunity for clinical study given. The Woman's Hospital, which adjoins the college building, has over 4000 patients annually. In addition there is a large dispensary service, while the new college building is in every way adapted to the purposes of a medical school. In the session of 1885–86 the faculty comprises a corps of 10 able professors, with 16 additional lecturers and demonstrators, while the graduates number 33; the total number since the organization of the college being 431.

This pioneer institution for the medical education of women has given the instigation to others both abroad and at home. In London a "Ladies' Medical College" was opened in 1864. In the other countries of Europe the education of women in medicine has made some progress, while students have come to Philadelphia from long distances, even India sending its quota. A Brahmin lady graduated in the class of 1886. In America there are now six women's colleges in operation, and the position of woman as an admitted member of the medical profession has become fully assured.

After the system of homœopathy was introduced in the United States by Dr. Hans B. Gram, a native of Boston, in 1825, it gradually made converts. Dr. Detwiler, of Allentown, Pa., having embraced it in 1828, joined with some others in organizing the first school of homœopathic medicine in this country, the North American Academy of Homœopathic Medicine, established at Allentown in 1835. Instruction was given wholly in the German language, and for this and other reasons the institution was not patronized, and was discontinued after a few years. The second effort to establish a college was made in Philadelphia, Dr. Constantine Hering, one of the active agents in the Allentown enterprise, taking an active part in this also. This college, known originally as the Homœopathic Medical College of Pennsylvania, was incorporated and organized in 1848, and is the oldest institution of its kind now in existence. Its original faculty consisted of Drs. Jacob Jeanes, Caleb B. Matthews, Walter Williamson, Francis Sims, Samuel Freedley, Matthew Semple, William A. Gardiner, and Alvan G. Small. The first class consisted of 15 students, of whom 6 graduated. After a hard struggle for existence a schism took place in 1867 and a rival institution was organized, entitled "The Hahnemann Medical College of Philadelphia." In 1869 the two institutions were combined, the name of the younger being retained, under the charter of the older. Since that date the school has been prosperous. Its total number of graduates to date has been 1648, of whom 71 graduated in the present year (1886). At the present time a new and thoroughly adapted building is nearly completed for this institution, with an excellently arranged hospital and dispensary, and the future facilities for a medical education in the Hahnemann College will be up to the highest standard.

The later homœopathic colleges, with dates of organization up to 1876, are the following:

Cleveland Homœopathic Hospital College	1849
Pennsylvania Medical University, Philadelphia	1853
Hahnemann Medical College of Chicago	1855
Homœopathic Medical College of St. Louis	1858
New York Homœopathic Medical College	1860
New York Homœopathic Medical College for women	1863
Boston University School of Medicine	1869
Homœopathic Medical College of Detroit	1871
Pulte Medical College, Cincinnati	1872
Homœopathic Medical College of University of Mich.	1875
Chicago Homœopathic College	1876

Others have since been established in Iowa City, Ann Arbor, and other places, while several have ceased to exist. In 1874 there were thirteen in existence, that of Philadelphia remaining at the head in importance, while the total number of professors was 212, and of graduates, 430.

A third school of medicine in America is that known as the Eclectic. It professes to be intermediate between the other two, in that it claims to adopt all that is of proved value in either while holding itself free to vary in accordance with every new discovery. To this it adds the employment of what is known as "specific medication." These "specifics" are not directed to individual symptoms, but to special pathological conditions, on the principle that certain diseases generate similar morbid products, which may be excreted from the system by the use of these "specifics." Dr. Benjamin Thompson, of Concord, N. H., the founder of the botanic or Thompsonian practice, which at one time had a considerable degree of popularity, was one of the early members of this school. Also Dr. Wooster Beach, who founded, in 1826, the New York Reformed Medical College. A similar school was founded in 1832 at Worthington, Ohio. These were based on the idea of exclusive botanical treatment. They soon ceased to exist. The first regular Eclectic school was instituted at Cincinnati in 1843, under the title of the Eclectic Medical Institute. This, the parent school of Eclectic medicine, has had a fair measure of success. Up to 1875 it had matriculated 5375 and graduated 1804 students. In 1882 it had 8 professors and 272 students, of whom 100 graduated. In this year Eclecticism had in all 100 professors and 312 graduates. The doctrine of specific medication is due to Dr. John M. Scudder, Professor of Practice of Medicine and Pathology in the Cincinnati school. It is of recent introduction. The establishment of this school was followed by others, so that there were in 1884 9 in operation, including the Eclectic Medical College of the City of New York (1866), with 9 professors and 19 graduates, and the U. S. Medical College, N. Y., (1878), with 13 professors and 33 graduates. Others exist at Chicago, St. Louis, Atlanta, Oakland, Cal., etc. Yet the Eclectic schools of medicine cannot be said to be in a flourishing condition.

To the statistical information above given, concerning medical education in the United States, it is necessary to add certain pertinent remarks. That the institutions which have from time to time come into existence vary greatly in thoroughness of instruction, in their facilities for study, scarcely needs to be affirmed. The American desire to make money, on the one hand, has given rise to numerous schools of medicine in localities ill adapted to their purpose, and under instructors equally ill suited, their only advantages being those of low prices and easy examinations. On the other hand, the desire to become a doctor at little cost, either of money, time, or study, has kept many such tenth-rate institutions in existence, and helped to flood the country with a superfluity of ill-taught medical men. It is not, therefore, the greatest number of graduates that fixes the rank of an institution, but the character of the course and the ability of the professors, with the facilities for hospital practice and clinical study. The University of Pennsylvania, which in these respects has few rivals in the country, has for 50 years past added none to its list of annual graduates, its graduating class during that whole period ranging between 100 and 175. The same may be said of the Harvard Medical School. The graduating class of these colleges is considerably surpassed by that of institutions in which it is impossible to attain as thorough a medical education. Though the standard of medical education in America has been advancing for very many years, it has not displayed the rapidity that is desirable. The superior schools, having to depend upon public patronage for existence, have been forced to compete with rival institutions, often of greatly lower grade, and make their course much less thorough than the character of their professors and the facilities at their command rendered possible. Thus, of the 64 colleges existing in 1876, one-third were so located that they could give no valuable clinical instruction, and comparatively few were in propinquity to the large hospitals of the country. As to the requirements of these schools there had been a degree of retrogradation. The original medical schools of the country required two years' private study under a physician before entry. This requirement has been relaxed, and students are often accepted without any preliminary examination. It was the custom to crowd instruction in all departments of medicine on ungraded and mixed classes, in which all the branches of study were pursued at the same time, in annual terms of 16 to 20 weeks, and only two such courses were required for graduation. Of recent years there has been an earnest effort to improve upon this system, and graded courses of three years' duration are gradually being introduced into all the more important colleges, in some cases optional, in others obligatory.

The absurdity of the old system was evident, the raw student on entering college being put at once at the study of the elementary and of the most advanced branches, but the fear of losing their classes long held back even the leading colleges from adopting a more rational course. The homœopathists claim to have been the first to adopt graded instruction, the Penn Medical University, founded at Philadelphia in 1853, having arranged its classes in a graded course of four semi-annual sessions; these courses being entitled, successively, the *philosophical*, the *physiological*, the *pathological*, and the *practical*. This institution ceased to exist in 1864. In 1868 two of the regular schools had a graded course of instruction, the Chicago Medical College, and the Woman's Medical College of the New York Infirmary. The next to adopt it appears to have been the Hahnemann Medical College of Philadelphia, on its reorganization in 1869. The course was extended to three years, the class of the first year being entitled the *philosophical*, of the second year the *theoretical*, and of the third the *practical* class. It remained optional with the students whether they would enter this graded or the old two-year mixed course. This optional feature persists. In 1870 the Cleveland, and in 1872 the New York Homœopathic Colleges adopted a similar arrangement.

Of the regular schools of medicine, the Harvard adopted an extended and graded course in the term of 1871-72. The University of Pennsylvania, having a strong rival to contend with, had to proceed more cautiously, and it did not adopt a three-year graded course until 1877-78, after the idea had been adopted by several of the lesser colleges of the country. This course was made compulsory on all students, while the length of the yearly term has been increased since that date, and a fourth year of more advanced study is strongly advised, though not yet required. This is also the case at Harvard. In addition to this important step of progress in the higher class American colleges of medicine, the requirement of a preliminary examination to test the general intelligence and knowledge of the student has been adopted in several of the schools. The time must come when it will be a legal requirement in all, and only when such a preliminary examination, properly conducted and of sufficiently high standard, shall be associated with a graded course of three or, preferably, four years' duration, with a rigidly conducted graduation examination at the close, can American medical colleges attain a standing comparable with that of the more advanced schools of Europe, and furnish a class of medical men thoroughly versed in the requirements of their profession.

The interests of the higher medical education in America have had to contend with the rivalry of the many inferior schools, capable of giving a degree to poorly taught and unfit graduates, and of the diploma-selling institutions which have existed from 1833 to the present date, while many persons have practised medicine in the less-settled districts of the country without taking the trouble to obtain a degree. Many of these discouraging features are now obviated, and the profession is on a sounder basis than at any time heretofore, while the professors in our higher colleges are men of the highest standing in their profession, and many of them of world-wide reputation. The rivalry of cheap and inferior schools still remains, however, to depress the profession, and not until the general standard of medical education is considerably raised can we have a class of physicians in America in accord with the existing conditions of therapeutical and surgical knowledge.

Among the steps of recent progress we may note the organization of several schools for the medical education of colored men, such schools having been established at Lincoln, Pa., Washington, D. C., Shaw University, N. C., Nashville, Tenn., and other places. Schools of dentistry have also been established, either in connection with or separate from the medical colleges, the report of 1884 giving 18 such schools, with 350 professors and 326 graduates. There are also several schools of pharmacy now in existence for the study of the safe and proper preparation of medicines. Of these there were 17 in 1884, with 73 professors and 241 graduates. The United States are said to have now more physicians in proportion to the population than any other country in the world. In 1880 the number of physicians and surgeons, per the census report, amounted to 85,671, of whom 83,239 were male and 2432 female. In addition there were 12,314 dentists and 27,770 pharmacists. The proportion to the population of the country was as follows: physicians, 1 to 584; dentists, 1 to 4073; and pharmacists, 1 to 1811.

A few words in relation to the medical societies of America may not be here amiss. These exist in great numbers, and have done highly valuable work in the advance of medical science generally. In our larger cities these societies embrace members of the greatest ability in their profession, while their publications form highly important additions to the sum of medical literature. In connection with them exist valuable museums of anatomical material, and extensive libraries, the whole aiding greatly in the facilities for post-graduate advancement in a knowledge of medical science. The medical colleges of the country are credited in 1884 with libraries amounting to 61,089 volumes, of which 14,600 belonged to the dental and pharmaceutical branches. The total value of grounds, buildings, and apparatus is given at $3,495,200, and of productive funds at $622,139. This comparatively small sum of money at interest belongs mainly to a few of the larger colleges, which alone are to some extent freed from the necessity of depending on the annual fees of students for support, and able to institute reforms without dread of evil consequences financially. (C. M.)

MEDICAL TREATMENT, SPECIAL METHODS OF. The actual practice of medicine is still largely empirical, though regular physicians contemn empiricism (see EMPIRICISM in Vol. II.). Various methods, which have obtained a degree of popular favor, are here briefly described, with a statement of the efficacy claimed for them.

Food-cure is the exclusive use for a time of some special article or articles of diet, as milk, grapes, vegetable or farinaceous matter. "Graham bread" (see GRAHAM, SYLVESTER), or wheat ground without removing the outer coats, is used in the belief that the kernel makes only heat and fat, not muscle, bone, and nerve. Large success in healing is claimed from the faithful observance of these different diets, a negative merit consisting in the omission of foods or drinks that may have been hurtful.

Earth-cure means the immersion of a patient in whole, up to the neck, or a limb, in moist or dry earth, the walking barefoot in loose earth, or reclining upon it, and poulticing or dressing wounds or sores and stings with mud. A particular vital or magnetic emanation is claimed to distil from the earth and to be taken up by the soles of the feet, or the body generally, to give back strength where all other tried means have failed. Its value as a dressing for wounds, etc., may lie in its unexplained power of preventing putrefaction and deodorizing, as *e. g.* in the dry-earth closet.

Water-cure (Hydropathy), intimately associated with heat and cold, consists in sitting in water of different temperatures, having it douched in solid stream from a height, being wrapped or packed in wet sheets and so rubbed, in the application of wet compresses to different parts, and in the introduction of water into the various orifices of the system. It is credited with reducing local or general inflammation, stimulating relaxed or enfeebled tissue, diluting and expunging impurity. A possible freeing of electric or other force may explain some of its efficacy; while again some good effect may come from the manipulation or the rubbing attending it.

The steam or hot-air bath claims are chiefly for its sweating; but it is also asserted that this is debilitating, and is more like an osmosis, or filtering through tissue, than the vital chemical depurification of sweat through exercise or movement of the muscles. The rightful application of water, with its extremes of heat and cold, and shock of weight, requires the intuitive tact and the watchfulness of an extraordinary observer like Preissnitz, its founder.

Air-cure may embrace the compression of condensed air upon the surfaces, the rarefaction of exhausted air, the inhalation of gases or medicated vapors. The vacuum treatment is the enclosing of a limb, or the body up to the neck, in an air-tight cover, and partially pumping out the air, causing an expansion of the vessels of circulation, and aiding the removal of obstructions. This method is used in cases of rheumatism, paralysis, etc.

The *Oxygen treatment* is the inhalation of oxygen, pure or combined with air, or with nitrous oxide (laughing gas). The oxygen alone is used for suspended animation, or labored respiration from loss of air, for purifying the blood—as it is the supposed agent in the atmosphere for this use—for consumption, dyspepsia, etc. It produces generally at the time a glow of heat: the nitrous-oxide mixture is used in chronic cases, and by its anæstheticism often temporarily suspends pain. It is claimed to be more assimilable than oxygen alone.

Sun-air baths are the exposure of the skin to the direct rays of the sun, and are asserted to be as marked in their benefits to men as to plants.

Breathing Methods.—Catlin has elaborated his experiences among North American Indians, who claim that they preserve themselves against malaria by sleeping with closed mouth, and their squaws, beginning with the pappooses, compel them to sleep with closed mouth. Mouth-breathing is said to expose the teeth to extremes of temperature, and to allow impurities and cold air to act directly upon the lungs, while the nose is constructed to filter impurities, warm the air, and performs relatively the same offices for the lungs that the teeth and saliva do for the stomach.

Bronson's, or Abdominal Breathing, is based on the hypothesis that ordinary breathing is all by the chest, and not at all by the abdomen, while this should be reversed. The claim that children and animals breathe thus, and that it enables a deeper current of air to penetrate to the lungs, gives movement and rhythm to the contents of the abdomen, and a longer use of the voice in public speaking without fatigue.

Vocal gymnastics are taught to give greater lateral expansion to the lungs, chiefly by a slow, prolonged expansion of air, sometimes through a contracted orifice or pipe with valve, and with a vibration of the larynx sounding "Ah!" Four or five inches of expansion may be thus obtained.

Animal Methods extend from the microscopic germ to organs or parts of the larger animals. Freshly killed spleen of calf applied to the feet is claimed to have cured asthma in a child. Bullock's blood is drunk for consumption. Microscopists, finding special bacilli, or infinitesimal living creatures, as also vegetable germs, in the secretions of different diseases, and that certain chemicals can kill them, inject these latter into the diseased subject hypodermically or under the skin to destroy these germs, the coincidence of the germs and disease being regarded as cause and effect. Phemic acid is thus used to destroy the spores, supposed causative of fevers. Pasteur claims, by a process analogous to vaccination, but with a cultivated hydrophobia germ, to supplant the disease of hydrophobia by hypodermic injection of this cultivated product, causing a milder form of the disease in anticipation. Certain wild tribes are reported for a long time to have been in the habit of rubbing a preparation of dried snake-poison on the wrists, previously abraded, to procure immunity from all future snake-bites.

Surgical Methods may be classed as all mechanical devices employed for supplying deficiencies of structure, compensating deformities, re-establishing displacements, penetrating cavities, severing decayed parts, illuminating the natural orifices for exploration, and using braces, trusses, cutting- and boxing-tools, speculums, etc., frequently of great ingenuity and delicacy. This branch of medical science advances with the march of mechanical science, and develops new and bold penetrations into vital cavities, and detection of hidden disorders formerly unattempted, its chief handmaid being the modern use of anæsthetics.

Electricity.—Divisible into Galvanic, Faradic, and Franklinic. Galvanism is produced by the immersion of plates of two different metals, as zinc and platinum, in a dilute solution of acid, as sulphuric, connecting them together at the top by a metal clamp, and leading a wire off from each. A series of any number of these so-called cells containing the three elements may be connected for increased effect. In medical use it acts as a cutting and cauterizing instrument simultaneously; a platinum wire becoming heated by the current, without necessarily the presence of oxygen, severing connections and burning the termini, thus obviating the danger of bleeding. It also promotes the resolution of living tissue-tumors, etc., by electrolysis or chemical action. Applied to the principal nerve leading to a muscle, it causes a powerful contraction. It is used to stimulate the nerves of the special senses.

It is more capable of dangerous result than the Faradic.

Faradic, or electro-magnetic, or induced electricity, is obtained from this same cell or battery arrangement and a magnet. The current of the positive and negative wires is passed around a bar of soft iron, making it, while the current is entire, a magnet; this, arranged with a second bar, creates in it what is called a secondary or induced current, and from this the joint product is led by a positive and negative wire to the patient. For satisfactory strength the circuit in the primary coil has to be constantly interrupted, and is so broken by a current-breaker, or pheostal. This is the ordinary family instrument, and is used to produce general constitutional effect, and also special local action. The theory seems to be that in most cases, even where local aims are paramount, the general faradizing of the whole is best as an aid. Paralysis, rheumatism, dyspepsia, are very generally treated by it. Recent cases of hydrophobia and scarlet-fever are reported cured in this way. There is ground to credit it with a stimulation of the functions of vital organs, as those of digestion. Its application is by means of handles—electrodes—affixed to the ends of the wires—the positive and negative poles—to which can be attached sponges or special instruments. Moisture very much increases the conductivity, and salt still more.

Franklinic, or static electricity (little used), is produced by friction, and bands and plates are constructed of two metals, and attached to the surface of the body at different parts, for the purpose of creating a constant galvanic current in them.

Glass castors are placed under the legs of beds to insulate the body from terrestrial electricity, and the habit of sleeping with the head pointing to the north, in the direction of the magnetic meridian, has seemed important to some in the treatment of sensitive patients.

Movement-Cure.—Two main forces control action in animal life—the so-called vital or organic involuntary movement, evidenced in the functions of the viscera, and that controlling the organs of locomotion, or voluntary movement. The claim is made that motion of the parts on or about a vital organ reacts upon and vitalizes it; thus the exercise of shoulders and arms arrests cough and lung disorder. Movements about the waist and abdomen help the stomach, bowels, etc. Movements about the joints, by increasing activity of absorbents, and by actual divulsion of adherent fibres, reduces swelling, deposits, and stiffness. Nerve affections respond to muscular action because the congestion or inanition which may produce them is relieved in the former case by the blood supply being taken from its excess in nerve-tissue to meet the demand of the muscle, and in the latter by increased supply, it being an axiom that use of a muscle creates a demand for increased flow of blood to it. Movements for the cure of displacements of internal organs are claimed as the only radical means of permanent cure. They are made by placing the person in certain definite positions, and in these positions, which favor the return of dislocations, movements are made by the patient or assistant, or both, to invigorate the retaining tissues.

Lung congestion, formerly a subject for the lancet, is claimed to be effectually relieved by vibration of the extended arms by two attendants standing at either side; the surcharge of blood being drained off to meet the call of the agitated arms. The peristaltic action of the bowels is said to be essentially promoted by kneading—the contents of the bowels being mechanically urged along their channels—and by percussion of the liver. It is certain that immediate purgation has followed this liver vibration, the skin in making it being drawn tense by elevated arms and inflated lungs.

Machinery is employed to give a great variety of movement and vibrations, and it is claimed that in tissue change and heat producing it is much more vigorous, sustained, and effective than hand movements alone.

Neglect of the use of the voluntary muscles appears to result often in spasmodic, hysterical conditions, as if they sought this irregular vent in place of the absent regular one; in such instances skilled and patient education of the slighted muscles to their normal standard has proved a thorough and permanent cure.

Lift-Cure is a voluntary or single movement. The lifter stands with spine erect, knees bent three or four inches, upon a platform resting upon spiral springs, and grasps with his hands a cross-bar connected with springs and neatly adjusted weights. The operation consists in straightening the bent knees, preserving the spine erect—shoulders, hips, and ankles plumb—and slowly raising the weights through a space of three or four inches and as slowly returning them, then rising up again, drawing a deep inspiration. The important feature in this is the assistance given by the springs, so that the muscles are called very gradually into play and all strain prevented. The operation is claimed to favor the flow of blood currents from centre to circumference, filling the capillaries of the skin, drawing the blood off from possibly conjested internal organs and brain, induce sleep, warm the extremities, tone up the system generally, relieve sluggish digestion, help rheumatism, paralysis, and neuralgia, and reduce corpulence.

It differs from "movements" in using all the muscles at once, and (it is claimed) in as harmonious relation to each other as is possible, and with an enhanced effect on individual parts.

It gives the greatest amount of exercise with the least nervous exhaustion, and in the shortest time.

Massage, in its restricted sense, is understood as the application of the hand of an operator to the body of a patient; by rubbing over the clothing or on the skin; by moving deeper tissue either with or without accompanying surface rubbing, as in kneading; also by percussion and stretching. It differs from movements (except the passive) in the absence of voluntary action by the patient. In a more extended sense it is any application of the hand alone for remedial use. The movement of a muscle by pressure from without has been demonstrated to be able to effect the transfer of devitalized blood from muscle cells to interstitial tissue, and its replacement by arterial blood, independent of its natural source, voluntary motion.

Light surface strokes have a peculiar effect on the system through the nerves of sensation. Light continuous strokes even over the clothing often induce feelings of great pleasure and quiet to the extent of sleep. The steady holding of the hand over an affected part until moisture occurs relieves pain and apparently often internal disturbance. The cure of almost every form of disease and control of mental state has been claimed for hand treatment.

Mind-Cure notes the direct effect of the various emotions of the mind upon the organs of the body and endeavors to reduce the same to a scientific application. To this action of the mind upon the body must be relegated the actual cases of so-called faith-cure. (See FAITH-CURE and CLAIRVOYANCE.)

Color-Cure is the theory that certain colors induce certain bodily conditions (as red stimulating, blue calming), and that exposure of the skin of the affected part to certain solar rays transmitted through glass stained to admit these tints is curative of rheumatism, neuralgia, and various other disorders.

Music-Cure has been known as far back as the time of Saul and David. It is asserted to have radically cured, by certain instruments and certain melodies, serious disorders.

The Sanitarium or hygienic method is a building in a healthy region, with abundant pure water, away from the excitements of city life, where baths, rubbing, electricity, and all other medications except drugs are employed; a careful diet, generally vegetarian, being substituted. (J. W. L.)

MEEK, FIELDING BRADFORD (1817–1876), an American geologist, was born at Madison, Iowa, Dec.

10, 1817. He was early interested in scientific studies, but engaged in mercantile business until 1848, when he became an assistant in the U. S. Geological Survey of the Upper Mississippi. In 1852 he began to assist Prof. JAMES HALL (see ENCYCLOPÆDIA BRITANNICA) in his work on the palæontology of New York, and afterwards was engaged in the State Survey of Missouri and extended his researches over Dakota. After 1858 he resided in Washington, engaged in scientific examination of the organic remains furnished by the U. S. exploring expeditions. He died at Washington, D. C., Dec. 28, 1876. Besides his contributions to the scientific journals he prepared reports on the palæontology of various parts of the United States, which have been published by the general government and by several States.

MEIGGS, HENRY (1811–1877), an American merchant and adventurer, was born at Catskill, N. Y., in 1811. He engaged in business at Boston and afterwards in New York. He failed in 1837, but soon recovered. In 1848 he took a cargo of lumber to San Francisco, and obtained such profits that he was able to enter in the business there on a large scale. In 1854 a panic deranged his affairs, and he departed secretly with his family for South America. He became a bridge-builder in Chili, and soon took contracts for railroads which yielded immense profits. His later enterprises were chiefly in Peru and gave him enormous returns. He discharged all his debts in California in full. He died in Peru, Sept. 29, 1877.

MEIGS, CHARLES DELUCENA (1792–1869), an American physician, was born at St. George's, Bermuda, Feb. 17, 1792. His family afterwards removed to Georgia. He graduated at the University of Pennsylvania in 1814, and after spending some years in the South settled at Philadelphia in 1820, making a specialty of obstetrical practice. He was professor of obstetrics at the Jefferson Medical College from 1840 to 1862. He died at Ivy Mills, Delaware co., Pa., June 25, 1869. He published several medical works, among which are *Midwifery* (1838); *Obstetrics* (1849); *Puerperal Fevers* (1854). He also translated Comte de Gobineau's *Typhaine's Abbey* (1868).

MEIGS, MONTGOMERY CUNNINGHAM, an American general, brother of the preceding, was born at Augusta, Ga., May 3, 1816. He was educated at the University of Pennsylvania and at West Point, graduating from the latter in 1836. He entered the engineer service, and was employed in the construction of various fortifications until 1852. He then undertook the construction of the aqueduct from the Potomac River to the city of Washington. The engineering ability and originality displayed in this work gave him high rank in his profession (see BRIDGES, Vol. I., p. 634). During the years in which the aqueduct was in progress Capt. Meigs was also engaged in important architectural work, especially the extension of the Capitol at Washington. In November, 1860, he went to Florida to strengthen the forts at Key West against expected attack. In May, 1861, he was appointed quartermaster-general of the U. S. army, with rank of brigadier-general. This position he held throughout the civil war, discharging its responsible duties with great and uniform success. In November, 1863, while on business of his department at Chattanooga, he took part in the battles of Lookout Mountain and Missionary Ridge. He went to Europe in 1867 and again in 1875. In all the positions which he was called to fill he displayed the highest administrative and executive ability.

MEIGS, RETURN JONATHAN (1740–1823), an American colonel, was born at Middletown, Conn., December, 1740. He was a major in Arnold's expedition to Quebec in 1775, and was made prisoner there, but was exchanged in 1776. Having raised a regiment he was made colonel, and for his exploit at Sag Harbor he received the thanks of Congress and a sword. He commanded a regiment at Stony Point, July 16, 1779, and served till the close of the war. In 1778 he settled at Marietta, Ohio, and afterwards took a prominent part in Indian affairs. He died at the Cherokee Agency, Jan. 28, 1823. His *Journal of the Expedition to Quebec* was published, with notes by C. I. Bushnell (1864).

MEIGS, RETURN JONATHAN (1765–1825), an American jurist, son of the preceding, was born at Middletown, Conn., November, 1765. He graduated at Yale College in 1785, studied law, and then went with his father to Marietta, Ohio, in 1788. He was frequently engaged in Indian warfare and negotiations. In 1803 he was made chief-justice of the Ohio Supreme Court, but in 1804 he entered the army as brevet colonel, and had command of the St. Charles district, Louisiana. Here again he was made judge of the Supreme Court in 1805, and he was judge of the U. S. District Court of Michigan in 1807. He was elected to the U. S. Senate from Ohio in 1808, and in 1810 became governor of that State. He distinguished himself during the war of 1812 by promptly organizing the State militia and affording protection to the border settlements. He was U. S. postmaster-general from 1814 to 1823. He died at Marietta, Ohio, March 29, 1825.

MEISSONIER, JEAN LOUIS ERNEST, a French painter, was born at Lyons, Feb. 21, 1815. His father was a salesman, and though the son early displayed taste for art, it was with difficulty that he obtained permission to follow his bent. He spent a few months in the studio of Leon Coignet, at Paris, then went to Rome and to Switzerland. In 1834 he exhibited his first work, The Visit to the Burgomaster, in which he took up the *genre* painting which had long been neglected in France. It was painted in that microscopic style for which he has since become famous. His special excellence, however, was first recognized in The Little Messenger (1836). Each figure, though small, is not only perfectly painted, but is sharply discriminated from the rest without being caricatured. His works soon attracted attention and commanded high prices, but he refused to yield to the temptation to paint rapidly. His pictures show the most careful study of the characters and times which they represent, while they excite wonder by their production on so minute a space. Several of them have been brought to the United States, and at various sales they have continued to maintain their high price. They are usually *genre* pictures, but he has also produced portraits and some historical pictures. Among the most famous are The Chess-Players, The English Doctor, The Painter in his Studio, Napoleon III. at Solferino, Soldiers at Cards, The Amused Cavalier, A Cavalry Charge (purchased by Mr. Henry Probasco, of Cincinnati), and 1870 purchased by A. T. Stewart, of New York. Meissonier was attached to the staff of Napoleon III. in the Italian war of 1859 and again in the German war of 1870. During the siege of Paris he held the rank of colonel. In 1843 he obtained a first medal, and since that time he has received numerous marks of honor. He was elected a member of the Academy of Fine Arts in 1861 and was its president in 1875. Besides his paintings he has executed a number of etchings of rare excellence, and in his earlier days he furnished illustrations to a number of books, especially for an edition of *Paul et Virginie* (1838), and a few for Balzac's *Comedie humaine.*

His son, **JEAN CHARLES MEISSONIER**, studied with his father, and began to exhibit in 1865. He obtained a medal in 1866, when he exhibited Taking Tea and Leusen and Rosine. He excels in portraits.

MELON. In America melons belong to two distinct species—*Cucumis melo*, which is usually meant by the term "melon" in European works, and *Cucumis citrullus*, the watermelon. The former is a native of Asia, and has had, perhaps, its best development in Persia; the watermelon is a native of

SeeVol.XV. p. 850 Am. ed. (p. 841 Edin. ed.).

Africa. No species of melon will grow under a temperature of 55°, hence in the more northern countries of Europe the melon is chiefly grown by artificial means. Much attention is paid to keeping the varieties pure, and even distinct races, in which the cantaloupe and netted melons would be regarded as distinct, are carefully preserved. In America, where the varieties cross so easily by the agency of insects, or vary in pursuance of a natural law of change, less value is placed on these distinctions, and hence the varieties of this species, of whatever form or character, came to be known indifferently as melons or cantaloupes. Now the former term is growing gradually into disuse in connection with these varieties, and getting to be applied exclusively to the watermelon. They are both grown in enormous quantities and are very popular as after-dinner or dessert-fruits, while in addition the cantaloupe is in great request as a breakfast relish. The varieties vary in productiveness, size, solidity, or sweetness. As a rule among cantaloupes the netted forms are the sweeter, and it is rare that the smooth and larger kinds become as popular as the smaller. Seedsmen's catalogues present new varieties nearly every year, which give way in a year or so to some new favorites. Cantaloupes have been raised in California 16 pounds in weight. In South Carolina watermelons have reached 45 pounds. The amount of land under watermelon culture in the United States has never been definitely ascertained. The sandy soils of the seaboard are the favorite localities, and New Jersey is about the most northern point where their culture is attended with high measure of success. Between this region and the Gulf of Mexico it is safe to say that hundreds of thousands of acres are devoted to melon culture. Many thousands of acres are devoted to growing for the New York market alone, and wagons estimated to contain 160,000 watermelons have passed over the ferries to New York city in a single day. When intelligently pursued the culture is regarded as very profitable. From a single acre $1500 have been received, leaving a large surplus over expenses, and receipts of $500 are not uncommon. But the plant requires rich food to yield well. Where manure can be readily obtained, about 20 loads are used to the acre. The best results follow where the land has been heavily manured for a crop of potatoes in the previous season. Where manure cannot be easily had the best practice is to sow the land with oats or clover, and plough down in the fall before planting. In the spring some light manure or fertilizer is spread over the surface, which is then bush-harrowed and rolled. In preparing for planting lines are marked out by the plough about 6 feet apart for cantaloupes, and 7 or 8 for watermelons. A hole is dug where the seed is to be planted, and manure placed at the bottom of the hole to give the young plant a good start, and the earth drawn over, forming a small mound. A number of seeds are planted to guard against accidents, but the plants finally thinned to three. As the plants grow the main branches produce chiefly male flowers. They are pinched back to force out side-shoots. These bear a good proportion of female blooms. The plant is not exhaustive of the mineral elements in the soil. Col. Wilder, of Boston, has had ten successive crops from the same ground, the last equal to the first. In gathering the fruit experts can tell when it is ready by a gentle pressure of the fingers, when a faint crackling is heard, and it parts readily from the stem when nearly ripe. The Persians believe the fruit is better when ripened in partial darkness, and draw earth over it when nearly mature. In America it is found to improve by keeping a few days in a fruit-house before using.

The insect enemies of the melon are the striped beetle, *Diabrotica vittata*, Fabr. (See Vol. I., p. 140), and the melon caterpillar, *Eudioptis hyalineata*, Linn. The eggs of the former are deposited near the ground, and the larva enters the stem, becoming the "cut-worm," through which the plants often die in a single night. The caterpillar of the latter feeds on the leaves, and is kept under by the use of hellebore powder, 1 oz. to 2 gallons of water. Tobacco water is also employed. Protection against the striped beetle is afforded by placing circular bands of stiff, brown paper, boards, or bricks around the young plant, the upper surface being covered with a pane of glass or cheap muslin. Glass is best where it can be used, as it is additionally useful in hastening the progress of the young plants. Some people do not take this trouble, but put tobacco stalks around the stems. The striped beetle has three broods a year, but if the plants are protected from the ravages of the first brood, the successive ones are not so troublesome. Melons, though delighting in light, warm ground, love to have some of the roots near moisture. Amateurs that pride themselves on great success, sink a large flower-pot, in which the hole has been nearly closed, near the stem of the plant, and fill it with soapsuds or other fertilizing liquid, which slowly percolates, keeping a regular and continuous supply of moist food for the plant. The first melons that appear in the northern markets come in from the West Indies about the middle of May. They ripen at St. Augustine, Florida, near the end of the month. In Virginia the commencement of gathering is the middle of July, in Maryland, Aug. 1, and in New Jersey the middle of August. The season in each lasts about a month.

(T. M.)

MELVILLE, Herman, an American author, was born at New York, Aug. 1, 1819. At the age of 18 he shipped as a common sailor, and in 1842 he deserted from a whaling vessel at the Marquesas Islands. Here he was prisoner for 4 months to the natives in Typee Valley, but escaped and returned to New York. His adventures furnished the basis of his first book, *Typee* (1846), and were further related in *Omoo* (1847). He then devoted himself to literature, producing several works of marked power. Among these are *Mardi* (1849); *White Jacket* (1850); *Moby Dick* (1851). In 1847 he married a daughter of Chief-Justice Shaw, of Massachusetts, and in 1850 took up residence at Pittsfield, Mass.

MEMMINGER, Charles Gustavus (1803–1880), an American statesman, was born in Würtemberg, Germany, Jan. 7, 1803. In his infancy he was brought to Charleston, S. C., and being left an orphan, was educated by Gov. Thomas Bennett. He graduated at South Carolina College in 1820, and was admitted to the bar in 1825. He opposed the nullification movement in 1831, and wrote the *Book of Nullification* (1832–33), a satire in Biblical style. He was for many years a member of the State legislature, and for twenty years chairman of the finance committee. In 1860 he was one of the leaders of the Secession movement, and was a special commissioner to Virginia to secure the co-operation of that State. When the Confederate Government was formed, he was made secretary of the treasury, and held this post until June, 1864.

MEMPHIS, a city of Tennessee, county-seat of Shelby county, and a port of entry, stands on a high bluff on the E. bank of the Mississippi River, below the mouth of Wolf River, 826 miles by water above New Orleans, and in 35° 8′ N. lat., 90° 5′ W. long. Its site is almost the only one between Cairo and Vicksburg suitable for a large town. The town is regularly planned, with wide and well-paved streets, and its appearance from the river is very striking and handsome. Eight lines of railway terminate either in the town or on the opposite bank of the river. The city has many excellent public and private buildings, among which are the custom-house, and the great warehouses which border the river-front. It has numerous churches, public and private schools for both white and colored pupils, many fine hotels, a large hospital, a public library, 5 national and several private banks, 12 weekly and 5 daily newspapers, 6 monthly periodicals, 2 medical schools, and a college of the Christian Brothers (Roman Catholic); and is the seat of an extensive commerce by rail and river. The largest sea-going ships can reach the town. Since the yellow-fever epidemics of 1878 and 1879, the drainage and sewerage works have been entirely reconstructed upon one of the latest and best improved systems. The water-supply is from Wolf River, and is made available by works operated on the direct pumping, or Holly system. Memphis ranks as one of the largest cotton marts in the world. It has many manufacturing establishments, including oil-mills, steam-gins, machine-shops, flouring-mills, etc. Memphis was founded in 1820, and was made a city in 1831. One of the principal naval battles of the civil war, "The Battle of the Rams," occurred near the town, June 6, 1862. It was then seized by the Union troops. In August, 1864, Gen. N. B. Forrest recaptured it, but did not hold it. In 1870 the city had 40.226 inhabitants, but owing to the prevalence of 3 yellow-fever epidemics in the next decade, the population in 1880 had fallen to 33,592. The thorough reconstruction of the city's drainage and sewerage has, however, restored to the city its old prosperity, and given it much more than its old population. In 1879 the State legislature, in order to relieve the town of its financial embarrassments, revoked the city charter, and established a government by a council, but this measure was reversed by the supreme court of the State.

MENABREA, Luigi Federico, Marquis Val-Dora, an Italian statesman, was born at Chambéry, Sept. 4, 1809. He entered the engineer-corps of the Sardinian army, and was appointed professor in the military academy at Turin. In 1848 he was sent to the Italian Duchies to prepare the way for their annexation. He afterwards served in the ministry of war and of the interior. In the war against Austria, in 1859, he was chief of staff, and fortified Bologna and other cities, and conducted the siege of Gaeta. In 1861 he was made count and appointed minister of the marine. He constructed the arsenal at Spezzia, and introduced many reforms. In 1867 he was called to form a cabinet, and took charge of foreign affairs, then extremely complicated. Opposition to the bold movements of Garibaldi caused his ministry to lose the support of parliament, but at the request of the king he formed a new one, which remained in power until November, 1869. In 1875, Count Menabrea was made Marquis of Val-Dora, and in 1876 was sent as ambassador to England. He is an accomplished mathematician and engineer, and has published *Le Genie italien dans la campagne* 1860–61 (1866).

MENAGERIE. See Zoölogical Garden.

MENHADEN. See Fisheries.

MERCER, Charles Fenton (1778–1858), an American statesman, was born at Fredericksburg, Va., June 6, 1778. He graduated at Princeton College in 1797, and was made captain of cavalry in 1798, when war with France was expected. He afterwards studied law, and in 1802 went to Europe for a year's travel. In 1810 he was elected to the Virginia legislature, and in 1813 was made a brigadier-general with charge of the defences of Norfolk. In 1816 he was active in behalf of the Chesapeake and Ohio Canal. In 1817 he entered Congress as a Federalist, and remained in continuous service until 1840, being then a Whig and an advocate of protection. In 1853 he visited Europe to concert measures for the abolition of the slave trade. He died at Howard, near Alexandria, Va., May 4, 1858.

MERCER, Hugh (1721–1777), an American general, was born at Aberdeen, Scotland, in 1721. He was educated at the University of that city, and became a physician. Having served in the battle of Culloden in 1745, he emigrated to America and settled near Mercersburg, Franklin co., Pa., 1747. In the wars with the Indians he was a captain and a comrade of Washington. He was severely wounded in Braddock's expedition, and being separated from his command, reached Fort Cumberland after weeks of suffering. When the provincial forces were reorganized in 1758, Mercer was made lieutenant-colonel and went with Gen. Forbes to Fort Duquesne, of which he took command. He afterwards settled at Fredericksburg, Va., when he practised his profession. On the outbreak of the Revolutionary war he warmly asserted the rights of the colonies, and in 1775 raised three regiments of minute-men. In 1776 he was made colonel and organized the Virginia militia. Congress appointed him brigadier-general, June 5, 1776. He led the attack at Trenton, Dec. 25, 1776, and afterwards suggested the night march on Princeton. Commanding the advance, he encountered a large body of British troops, Jan. 3, 1777, and in the ensuing action was mortally wounded. He died at Princeton, N. J., Jan. 12, 1777.

MERIDEN, a city of Connecticut, in New Haven county, 18 miles N. by E. of New Haven, is on the New Haven and Hartford Railroad, at the junction of a line to Cromwell. It has a city hall, 7 hotels, 3 national and 2 other banks, 1 daily and 2 weekly newspapers, 10 churches, excellent public schools, a large number of manufactories, gas-works, excellent water-works, and a park. The manufactured articles include woollens, hardware in great variety, bronze, silver, britannia, and plated wares, fire-arms, cutlery, and a great variety of other goods. The tax valuation is $10,000,000; city debt, $365,000. Meriden is the seat of a State reform school. It was incorporated as a city in 1867. The population, 15,540, in 1880, has since much increased.

MERIVALE, Charles, an English clergyman and historian, was born in 1808, being the son of John Herman Merivale (1779–1844), who published some volumes of chancery reports and a few poems. Charles graduated at St. John's College, Cambridge, in 1830, and became fellow and tutor there. He was select preacher before the university in 1838–40, and in 1848 became rector of Lawford, Essex. He was Hulsean lecturer in 1861 and Boyle lecturer in 1864. He was chaplain to the speaker of the House of Commons from 1863 to 1869. He was made dean of Essex in December, 1869. He is specially noted for his historical labors, having undertaken, in his *History of the Romans under the Empire* (6 vols., 1850–62), to fill the gap between the works of Dr. Arnold and Gibbon. The merits of his work have been recognized by all scholars; it is clear, calm, and dispassionate. It does ample justice to the founder and propagators of Christianity as well as to the philosophers and statesmen of the Roman Empire. Dean Merivale has also published a briefer *General History of Rome* (1875). Among his other works are a rhymed translation of *Homer's Iliad* (2 vols., 1869); the *Conversion of the Roman Empire* (1864); the *Conversion of the Northern Nations* (1865).

His brother, Herman Merivale (1806–1874), was a barrister and became professor of political economy in Oxford University. He was under-secretary of state for the colonies in 1848 and for India in 1859. He died at London, Feb. 9, 1874. He published *Colonization and Colonies* (2 vols., 1841–42); *Historical Studies* (1865); and a *Life of Sir Henry Lawrence* (1873).

MESQUIT. See Mezquite.

METALLURGY, broadly speaking, embraces the entire art of extracting metals from their ores, and it also includes the working of the metals so obtained. In a more usual acceptance of the term, it is restricted to the former part. For the sake of a general description of the mechanical appliances and the processes commonly employed in practical metallurgical operations, we will assume that the ore to be treated is in the form of large lumps.

See Vol. XVI. p. 62 Am. ed. (p. 57 Edin. ed.).

Comminution of Ores.—The lumps of ore are reduced to the desired size either by means of a sledge or by some form of mechanical contrivance. The Blake stone and ore crusher is much employed both

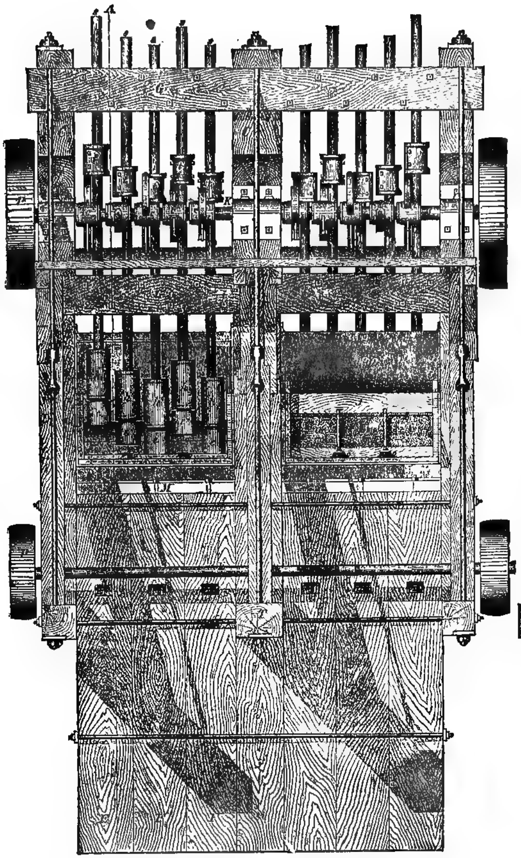


FIG. 1.—Front view of Stamp-mill.

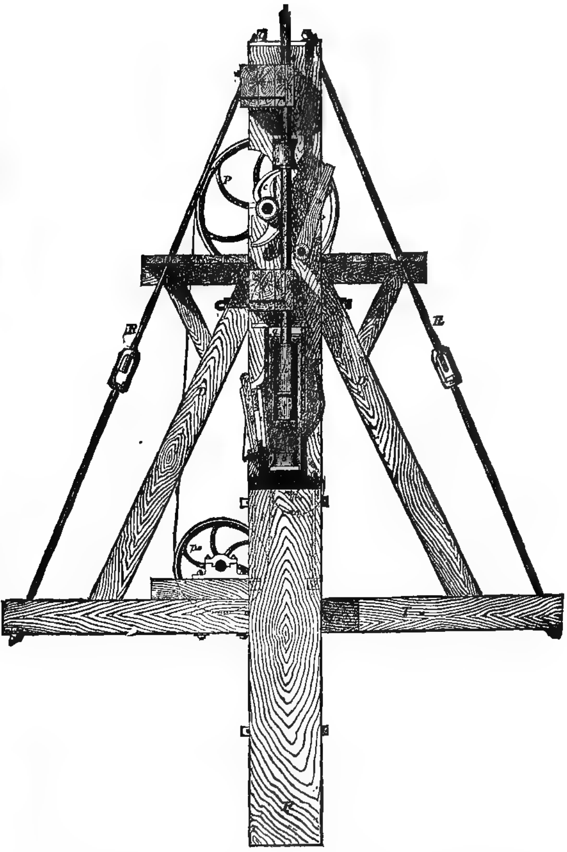


FIG. 2.—Side view of Stamp-mill.

in the United States and in foreign countries for the purpose of crushing all kinds of ore to a convenient size for passing through the mill. If a powder, more or less coarse, should be required, a pair of cylinders of equal diameter, made usually of chilled iron or steel, is used for the comminution of the ores. The cylinders are so geared that they revolve in opposite directions, and can be so spaced as to make their peripheries impinge, thus producing a fine flour, or they can be spaced further apart for the production of a powder more or less coarse. Long experience has demonstrated the fact that the difficulty of concentrating an ore increases with its fineness; consequently it is of great importance to reduce the metalliferous grains as near as possible to their natural dimensions. The stamp-mill is one of the oldest and most widely-used pulverizing contrivances employed in connection with mining and metallurgical operations. The common form of a stamp-mill consists of a number of iron-shod pestles, which are so arranged as to be lifted by means of a cam or other mechanical contrivance, and, after reaching the desired height, the pestles are allowed to fall by force of gravity, and drop into a mortar, which latter is so arranged as to allow a continuous feed and discharge of the stuff under treatment.

Fig. 1 shows a front elevation and Fig. 2 a sectional view of two five-stamp batteries, such as are used in California, Colorado, Nevada, etc. The various parts of the stamp-mill are indicated by the letters of reference on Fig. 2.

Fig. 3 shows a longitudinal section of one form of mechanical device used for feeding the ore to the stamp-mill. A is the frame of the feeder supporting a hopper, B, into which the ore is received; and C is a circular disk or table having a central shaft, D, turning in a box, D′, and standing at such an angle that the upper surface of the table will be inclined downward from the rear of the hopper toward the front or discharge edge. F is one of the two guides, between which the ore passes and by which it is directed to the proper point of discharge. The table is rotated by a bevel-pinion, H, engaging a bevel gear-wheel, J. A collar upon the stamp-stem strikes the end of the lever L or a rod, L′, connected with it and extending upward from it. This lever is connected by a pitman, M, with an arm, N, which projects from the rim of a wheel, O, which turns loosely upon its shaft. In order to return the lever L to the point of action after each stroke of the stamp, and with it the oscillating wheel, O, there is employed an arm, S, one end of

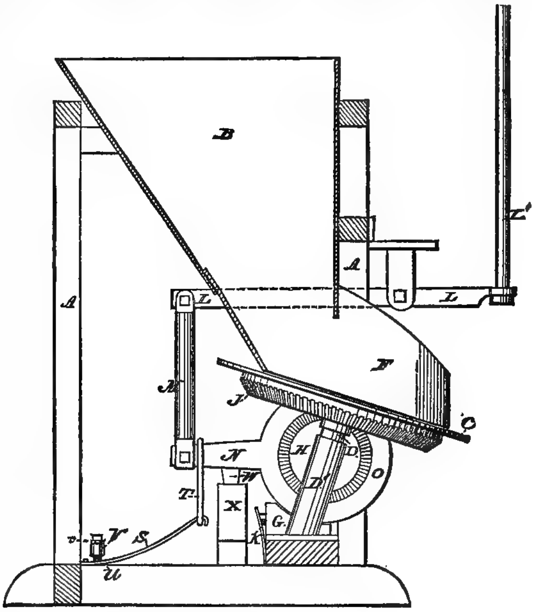


FIG. 3.—Stamp-Feeder.

which is connected by a link, T, with the lever-arm N. The opposite end of arm S engages a screw-bolt, *u*, fixed in the frame-timber, which bolt extends up through a hole in the plate near its bearing end. A block of rubber, V, is adjusted upon the bolt by a nut, *v*, at the top, so as to give any desired elastic pressure upon the arm S, and thus return the various parts with a positive motion after the action of the stamp-stem upon them. W is a block, preferably of wood, upon the top of which the arm N rests when relieved by the action of the spring. This block W fits into an opening in the top of a slotted box, X, through which a wedge passes. This wedge is operated by a screw, and serves to raise or lower the block W to suit any degree of movement of the feed apparatus which may be desired.

By this mechanism it is possible to accurately control the movement of the rotary table and the quantity of ore fed to the mill. The stamps vary in weight from 500 to 1000 pounds. They are lifted and drop about 8 or 9 inches, making from 70 to 90 blows per minute. Wet crushing is employed for some grades of ores; that is, a stream of water is admitted to the mortar with the ore, and, flowing off, carries with it the pulverized ore as soon as the latter is sufficiently reduced in size to pass through the screens placed in front of the discharging apertures of the mortar. The object in view in pulverizing an ore is to prepare it for the washing process. There are a great variety of contrivances in use for the purification of ores by washing. The apparatus shown in Fig. 4 is an ingenious one. It is intended to be used for washing gold and silver-bearing sands, and can be operated either by hand or by power. The ordinary charge of a pan of this description, measuring 18 inches in diameter, is 2 gallons, and it is claimed that a washer with a pan of this description can work over about 6 tons of auriferous sand in 10 hours of effective work. Washers of larger dimensions can be operated by any suitable motor, and can be used in tanks or other receptacles, or even in a stream of water.

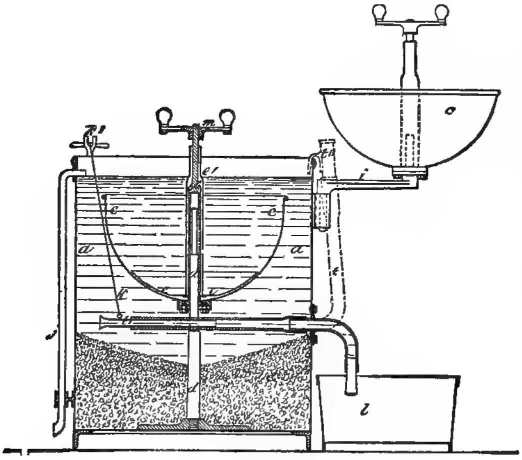


FIG. 4—Ore-washing Machine.

Fig. 4 shows a vertical section of Bazin's apparatus for washing auriferous and argentiferous sand. This so-called centrifugal hydraulic washer is composed of a tank, *a*, made of sheet-iron, filled with water, and furnished in the centre with an upright support or standard, *d*, intended to carry the washing-pan *c*, which should be caused to rotate around this axis at the velocity necessary for the expulsion of the sterile matters. In the centre of the washing-pan there is solidly fixed to it a socket which, resting upon the standard *d*, allows the desired rotary motion to be imparted by the aid of the handles, *m*, placed on its upper end. A gatherer, *e*, furnished with a sheath, *e'*, covering the socket, occupies the centre of the pan. It is intended to collect the residues of the washing operation, so that they may be removed without its being necessary to take the pan itself out of the water. One or more brackets, *i*, supported in sockets riveted to the side of the tank *a*, support other washing-pans, forming a series suitable for treating different descriptions of materials. A small pipe, *j*, serves as an overflow for the water from the tank and allows the overflowing water to be collected. By the aid of an India-rubber tube, *t*, traversing the interior of the tank and furnished at its extremities with metal ends, *t' t''*, and of a rod, *k*, with a handle, *k'*, for directing the end *t'* of the interior suction-tube, *t*, the sands deposited at the bottom of the tank are emptied into the cistern *l* by the action of the hydraulic pressure, it being understood that the outer end, *t''*, of the pipe is dropped into the cistern *l*, and consequently to a much lower level than that of the water contained in the tank *a*. At the end of the operation the outer end, *t''*, of the tube is hooked up to the side of the tank—an arrangement which avoids the employment of a stopper or cock. In some cases a small rake is used to triturate, work up, and separate earths which are somewhat compact.

On a large scale the stuff from the mortar of the battery is usually run into settling tanks. In the mills treating the Comstock ores, the stuff is discharged from the battery and conveyed in troughs by means of the flowing water to a series of tanks arranged in front of the batteries. These tanks are 3 or 4 feet deep by 5 or 6 feet square, and communicate with each other near the top. The water flows from one tank to another, depositing the crushed ore which it carries in suspension, and the water does not finally leave the tanks until it runs off quite clear. The sand or crushed ore is removed from these settling tanks, and is next thrown into pans, where it is further comminuted, and the precious metals extracted by amalgamation with quicksilver. The sand is thrown into the pans, and water is at the same time admitted into the pan with it; heat is then applied, either by admitting the steam into the steam-chamber underneath the pan, or directly into the pulp. After the sand has been worked in the pan for about an hour, a supply of quicksilver, ranging from say 60 to 70 lbs. to each 1250 lbs. of ore, is distributed over the pulp in a finely-divided condition. Sulphate of copper and salt, in various proportions, ranging from 1 lb. to 4 lbs. for each charge of ore, are added to the material in the pan soon after the commencement of the grinding process, or at the time of adding the quicksilver; the object being to promote the amalgamation of the precious metals with the quicksilver. The amalgamation is usually accomplished in 2 or 3 hours after the completion of the grinding. The materials are then diluted with water and run out of the pans into the separators, where the pulp is gently agitated in order to promote the settling of the amalgam and the quicksilver. The separators are usually placed in front of but on a lower level than the pans, as will be seen in Fig. 5. The water is gradually drawn off from the separators by first drawing out a small plug near the top and afterward withdrawing other plugs lower down, and in this way the lighter portion of the pulp is removed, and at last only the amalgam and quicksilver remain in the bottom of the separator. The amalgam and quicksilver is then run from the bottom of the separator into a bowl, from whence it is ladled up and afterward thrown into a pan, where the amalgam is washed with water in order to free it from particles of dirt adhering to the surface. The amalgam is then pressed and strained in a conical-shaped canvas bag, and any quicksilver drained off under the pressure is returned to the amalgamating pans.

The process of amalgamating and concentrating gold and other precious metals and sulphurets in quartz-mills consists of amalgamated plates next to the battery having an inclined position, so as to allow the pulverized rock to pass over the plates. From these plates, charged with quicksilver for the purpose of amalgamating the particles of precious metals passing over them from the battery, owing to the gravity of the quicksilver, accelerated by a downward current of water and pulverized rock, and further accelerated by the jarring of the battery-stamps, more or less amalgam is detached and passes off. This material then passes over flat blanket-sluices, similarly inclined, for the purpose of saving the sulphurets and any particles of precious metals which may have escaped from the preceding plates. Yet the current of water still carries off a portion of the precious metals and sulphurets.

Retorting.—The amalgam, after being removed from the pan and washed, as has been described, is next sublimated, during which process the quicksilver is separated from the precious metals. The retort is usually a cast-iron cylinder, 1½ inches thick, and measuring about 1 foot in diameter, and about 4 feet long. It is set in a brick furnace, and is sometimes furnished with trays for holding the amalgam. The interior of the retort, or of the trays if they are used, is covered with a thin clay wash, and the charge of amalgam, say 1200 lbs., having been placed in the retort, and the door tightly closed and carefully luted, fire is lit in the furnace. The heat at first should be gentle and the temperature of the retort be only gradually raised. In about 6 or 8 hours, when the quicksilver ceases to volatilize, the retort is allowed to cool gradually and the crude bullion removed. The bullion thus obtained is then broken up, remelted, and after being cast in ingots is ready for market. The general arrangement of the machinery in a mill, working silver ores by the method just described, is shown in Fig. 5, which is a sectional view of a mill and the principal machinery employed therein.

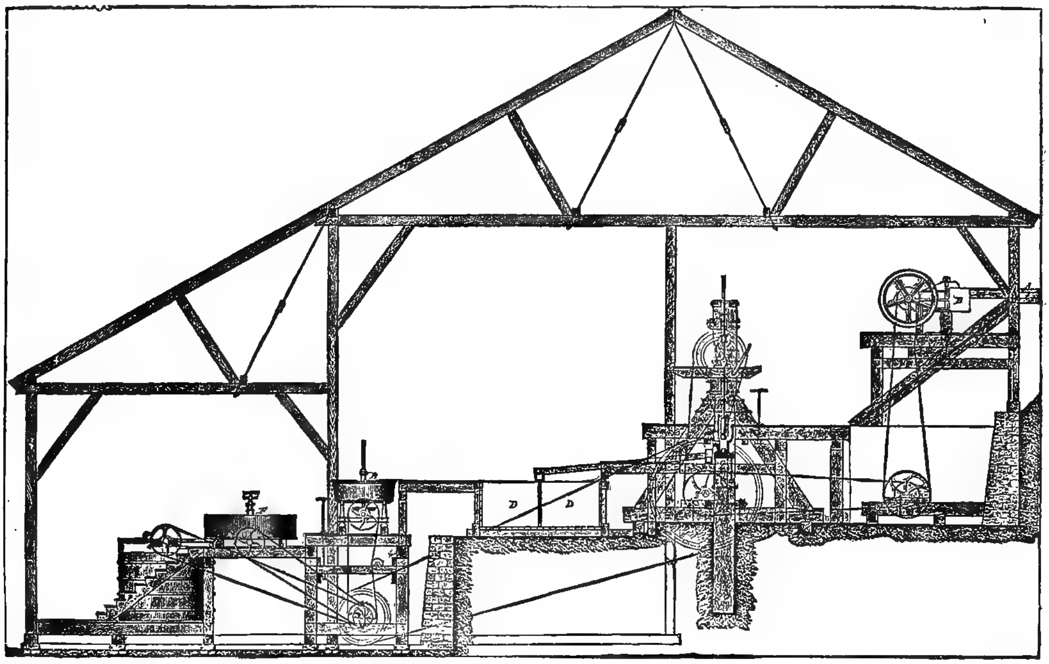


FIG. 5.

reatment of Copper Ores Preparatory to Smelting.—Differences in the composition of ores necessarily involve a difference in their treatment. Let us take for example the treatment of copper ores. Douglass says (*Mineral Resources of U. S.* (1883), p. 258, *et seq.*): "If we run down into a cupola furnace a sulphuretted ore of iron and copper, carrying more or less quartz, lime, and earthy matter, there will result (1) a slag carrying all of the silica, lime, alumina, and perhaps some of the iron of the sulphates, and (2) a matte carrying all, or nearly all, the sulphur, combined with the copper and most of the iron, the result will be little better than would have been obtained by a careful concentration of the ore which would have removed the light gangue from the heavy mineral. But if, before smelting the ore, it be thoroughly roasted, there is eliminated the sulphur as sulphurous acid gas, and the iron and copper are converted into oxides. If now this roasted ore be fed into a cupola furnace, the siliceous and calcareous gangue is slagged off as before, and if enough silica be present all the iron which existed in the pyrites will be similarly disposed of, while the copper oxide will be reduced by the action of the carbon of the fuel, and can be tapped out as metal. As nature has in the prominent mines of the South-western States oxidized the copper, the treatment is there simplified to a single reducing fusion in a cupola furnace, whereas the sulphuretted ores of the Atlantic coast and of Montana, and also those occurring in the North-west, must be first artificially oxidized.

"Copper smelting in this country is practised: (1) On the concentrates from the native ores of Lake Superior, which are subjected to a single fusion, whereby the copper is separated from associated iron oxide and silica, preparatory to a refining operation in the same furnace. (2) On the carbonate ores of the South-western States, which are worked exclusively in cupola furnaces, and which yield to a single fusion a coarse copper, which is shipped eastward for refining. (3) On sulphuretted ores both at certain mines and at central establishments in the East. When the ores are basic the cupola furnace is used; when siliceous, the reverberatory. At some mines and at one of the coast works both cupolas and reverberatories are used." (See COPPER.)

Humid methods are adopted for extracting copper from its ores—(1) When the quantity of copper present is too small to admit of the application of a furnace method. The reagents consumed in dissolving copper from its associated minerals are generally in proportion to the absolute quantity of copper present; and, consequently, when the copper contents are low, the quantity and cost of the necessary solvents are proportionally reduced, in case the non-cupriferous ingredients are inert and unacted on; whereas the fuel, which is the principal reagent in all smelting methods, has to dispose of and alter the constituents of not only the copper, but likewise the gangue. (2) When the ore contains injurious elements which cannot be eliminated in the smelting furnace, as, for instance, arsenic and antimony. (3) When the copper is associated with other metals, economically valuable, which, if all were smelted together, would pass into valueless combinations. For instance, the pyritous ores of

Spain, after their sulphur has been roasted off, might be smelted; but by so doing the silver would enter the copper and be lost, and the iron would enter the slag and become valueless.

Local conditions at any given locality, such as the value of fuel, which is always sparingly consumed in humid methods, compared with the value of the dissolving or precipitating reagents, which in some places are very cheap and in others unobtainable at economical figures, as well as the character of the ore and its contents, must determine whether a dry or a wet method shall be selected, and, if the latter, which one of the many proposed shall be chosen. Among the deterring conditions in any case is the presence of a considerable quantity of lime, magnesia, or other constituent in the ore, which by consuming the solvent occasions its waste.

Every wet method consists of two principal operations—the separation of the copper by solution from the other ingredients of the ore or mixture; and the separation of the copper in the solution from any other substance held in solution, by precipitating it as metal, as oxide, or otherwise.

The wet methods may be grouped into two principal classes—those in which the fresh solvent has to be used for the extraction of the copper from each successive charge; those in which the solvent is renewed or regenerated in one of the later stages of the operation.

Treatment of Lead Ores Preparatory to Smelting.—The metallurgical success of smelting lead ores depends in a great measure upon the composition of the slags, and with cerussite ores successful smelting may be said to wholly depend upon the slags. But as soon as sulphur, arsenic, antimony, and other electronegative elements enter into the composition of an ore, this alters the case. It is necessary to eliminate them in some other manner before the pure lead can be extracted without difficulty. Hahn, in the *Mineral Resources of the United States* (1883, p. 324, *et seq.*), describes two ways of doing this—(1) By precipitation by means of metallic iron; (2) By roasting the ore.

Precipitation by Iron.—This process is only applicable to galena ores and lead ores contaminated with small quantities of the sulphides, arsenides, and antimonides of other metals, to which should be added all sulphates, arseniates, and antimoniates, as they are reduced in the furnace to sulphides, arsenides, etc. It is based upon the fact that iron has a greater affinity for the electronegative elements than lead and silver. If, therefore, iron is brought in contact with molten sulphide of lead or silver, it will, as soon as it has acquired the proper temperature, combine with the sulphur, while lead and silver are set free as reguline metals. The affinity of silver to sulphur is, however, stronger than that of lead, which is the reason why some sulphide of silver is undecomposed, remaining with the sulphide of iron.

The compound of iron and sulphur is metallurgically called a *matte*, while that of iron and arsenic or antimony is termed *speiss.* The latter has a higher specific gravity than the former, which is the reason why, if both are produced during a smelting operation, the matte floats on top of the speiss. The mattes retain more silver than the speisses, while with gold the case is exactly the reverse. Lead enters the speiss only in the metallic state in the form of shots, while in matte it will be present as sulphide. Copper enters into either as sulphide and arsenide, respectively, as it has a strong affinity for both sulphur and arsenic.

The iron may be present in a matte either as diferrous sulphide (Fe_2S) or as ferrous sulphide (FeS), but never as ferric disulphide (FeS_2), because the latter on being exposed to a strong heat is decomposed into magnetic sulphide and free sulphur. The former does not fuse well. It is mushy and liable to chill in the furnace, thus forming an accretion. It is therefore well to aim at making ferrous sulphide (FeS) in computing a charge. If copper be present in a lead ore, it will go into the matte as cuprous sulphide (Cu_2S). On the strong affinity of copper for sulphur is based its separation from lead.

Experience has taught the practical smelter that only crystalline speisses of a bloomy texture, similar to that of spiegeleisen, from R_5As towards RnAs, will work well in the blast-furnace. An addition of metallic iron will improve the liquidity of speiss.

The Roasting Process.—The object in roasting an ore is to expel its sulphur, arsenic, or antimony, and convert the metals contained in it into oxides, in which form they are best adapted either to be carried into the slag or into the metallic state during the subsequent smelting. The roasting is carried out by exposing the ore to the action of heat and air, in consequence of which sulphur, arsenic, and antimony are volatilized as sulphurous, arsenious, and antimonious anhydrides, respectively, while the metals remain in the oxidized state. According to the apparatus in which the operation is performed, the result will be more or less complete. The roasting of arsenical and antimonial ores is rendered more difficult by the simultaneous formation of arsenic and antimonic acid, which combine with the metals to form arseniates and antimoniates. These compounds can only be decomposed by repeated additions of carbon and access of air, whereby the arsenic and antimonic acid are reduced to their arsenious and antimonious anhydrides, and thus gradually volatilized.

Ores containing sulphide of zinc (zincblende, sphalerite) are also difficult to desulphurize by roasting, inasmuch as zincic sulphate is always forming, which is only completely decomposed in a white heat. Mr. Stetefeldt found that sulphate of zinc is the most constant compound in the fire next to sulphate of manganese. While during the first two hours of roasting nearly all the sulphate of iron had been decomposed, there was still a large percentage of zincic sulphate undecomposed at the ninth hour. This behavior of zinc makes zinciferous ores difficult to work. In the blast-furnace any sulphate of zinc remaining undecomposed after roasting will be reduced again to sulphide. This substance goes partially into the matte, if any is forming, partially into the slag, which it makes thick and stiff. It also carries silver along, and thus gives rise to losses above and beyond those inherent to all metallurgical processes.

Roasting Furnaces.—With regard to the apparatus used for roasting, preference is given in the United States to reverberatories, ranging from 30 to 40 feet in length and from 10 to 12 feet span, divided into 4 or 5 hearths. This arrangement admits of keeping 4 or 5 charges in the furnace, in as many different stages of treatment. As soon as one charge is drawn, each preceding one is moved forward one by one, and a fresh charge is put in. The time of roasting varies with the amount of sulphur in the ore, the bulk of the charge, the quality of the fuel, and also with the altitude of the locality above the sea-level. The size of the ore has a great influence upon the completeness of the desulphurization, and the more zincblende there is in it the finer it should be. At Robinson, Colo., for instance, the ores could not be crushed finer than walnut size; and although a charge of 1300 pounds remained in the furnace for 36 hours, there was still from 7 to 8 per cent. of sulphur left in the ore. The ore being highly zinciferous (21 per cent. ZnS), the slag resulting from smelting contained considerable silver. From Przibram, Bohemia, it is reported that blende ores have been roasted down to 1 per cent. sulphur.

If copper is present in an ore there should be sufficient sulphur left in the charge to get rid of it as matte; otherwise it will deteriorate the quality of the lead or be lost in the slag. Galena ores almost free from other sulphides roast better in a short furnace than in a long one, especially if the fuel does not yield a long flame.

For subsequent smelting it is more convenient to have the ore in lump-shape than in powder. Wherever, therefore, it is practicable, as in the case of ores with a large percentage of lead, to convert the ore into silicates, it should be done. The slag thus formed is drawn, and, after cooling, broken up into lumps of suitable size. As zinciferous and ferruginous ores cannot be slagged very easily, it will be sufficient to sinter or "agglomerate" them.

Wood is used as fuel in places where its abundance makes it cheaper than stone-coal, and it is preferable when it is of a resinous character. Mineral coal is, however, preferable to oak, mahogany, mezquite, or the lighter woods. (See FUEL.)

Matte Roasting.—Whenever there is any sulphur in a smelting mixture it has to be saturated with the necessary quantity of iron to form a matte of the right composition. To extract the lead and silver which these mattes retain, it is necessary to roast or calcine, and afterwards flux and smelt them exactly in the same manner as an ore. If they are so poor in lead that there is danger of its being kept entangled in the slag and thus lost, it is advisable to add plumbiferous ores or products in sufficient quantity to effect a complete separation of lead and slag in the furnace. A charge containing 10 per cent. of lead will be safe to answer this purpose, yet it is possible to obtain the same result with as little as 6 per cent. Poor matte is sometimes roasted in heaps, but the method is almost obsolete in the United States.

Furnaces.—A few notes on the forms of furnaces employed in the different branches of metallurgy in the United States are added here. The water-jacketed furnace has become an actual necessity to the smelters of copper, lead, etc., in the Western States, owing to the great cost of refractory building material. This form of furnace is composed of an inner and an outer metallic shell, between which water circulates in sufficient quantity to cool the inner shell, which is in contact with the smelting charge. As the jacket merely replaces the brickwork of the old form of furnace, it may be made of any shape and size. For siliceous ores the jacket should be made high, for basic ores, low. Most of those used for copper-smelting in Arizona are cylindrical in shape, and measure about 3 feet in diameter at the tuyeres; but for certain ores the diameter may be advantageously increased.

To keep a 3-foot furnace cool under a high blast, from 37,000 to 40,000 gallons of cool water must be daily passed through the jacket, under a head of not less than 10 feet. If the flow be deficient or too hot, steam is generated, the cold water is pressed back, and steam will blow out of the discharge pipe till the jacket is nearly empty. Where enough fresh water to cool the jacket is not available, the hot issuing water must be pumped back and, after cooling, be returned to the furnace. The cooling is usually effected in a series of tanks. It is more rapidly done by pumping the hot water into a small cistern, elevated 15 feet or so above the receiving tank, through the perforated bottom of which cistern the water falls in streams unimpeded through the air or, better still, upon a brushwood or other open filter, which exposes a large surface to evaporation. When a furnace is first blown in, the iron shell is exposed to the full influence of the heat, and more water is required than after the furnace has run a few hours, by which time a coating of slag protects the iron, and a rim slightly deflects the blast from the periphery of the furnace. The issuing stream may be almost boiling, but where the water is very calcareous and abundant it is preferred to allow it to flow so rapidly through the jacket that it is only warm when discharged. Much less lime is thus deposited in the jacket and it is said that no more fuel is consumed. When the flow of cold water is scanty, and cooling must be resorted to, it is well to couple the pump with the cold-water pipe, so that if the jacket steams obstinately a stream of cold water may be forced through it.

Blast.—The Blake blower is now used on most of the new furnaces in America. The blast is measured either by mercury or by water-gauges which are attached to the blast supply-pipe of each furnace.

Hot-blast Stoves have of late years been largely introduced in the leading works engaged in the manufacture of pig-iron. With some of these stoves it is possible to obtain a blast equal to 1500° Fahr., thereby resulting in great economy in working of blast-furnaces. In the best of these stoves the plan is followed of burning the waste gas from the furnace to the best advantage, so as to produce the full amount of heat that it is capable of producing. The best forms of these stoves are constructed of wrought-iron to retain the pressure of the blast, and have a lining of fire-brick to retain the heat and protect the plating. The blast is conveyed from the stove to the blast-furnace through wrought-iron pipes lined with fire-brick. The temperature of the blast is best registered by means of the copper ball and pint of water (Siemens' pyrometer), which gives the most accurate results under the varying circumstances of difference in the temperature of the air in a tuyere-house. Hobson's pyrometer is used for approximate observation, but in its use extreme differences of atmospheric temperature require to be taken into account.

Fuel.—Anthracite and bituminous coals, coke, wood, and charcoal, are all used in modern times for the production of heat for smelting purposes. The choice of fuel depends upon the economy with which it can be obtained and the nature of the ore to be treated. Mixtures of fuel are used under certain circumstances. (See FUEL.)

Aluminium.—The Frishmuth process for extracting aluminium (*q. v.*) differs from the French or Deville method in substance, as follows: The Deville process consisted essentially in converting alumina into chloride of aluminium, by passing chlorine through a heated mixture of alumina, carbon, and common salt in a retort, whereby the chloride was distilled off and was recovered, and then acting on the chloride by sodium on the hearth of a reverberatory furnace. Frishmuth converts the alumina (in the form of corundum, bauxite, etc.) into fluoride by fusing the mineral with fluoride of sodium after a previous heating with fluorspar. The fluoride of aluminium and sodium so obtained is then powdered, mixed with carbon and with the chlorides of sodium and potassium, and placed in a retort with a false bottom. Connected with this retort by a suitable pipe is another, into which he introduces carbonate of soda, charcoal, and lime. On heating the retorts vapor of sodium passes from the retort containing the soda mixture, which must be at a white heat, through the mixture containing the fluoride of aluminium and sodium, and separates the aluminium. The operation is varied by converting the fluoride of aluminium into chloride and treating that with sodium vapor in the same way as the fluoride.

Antimony.—The extraction of antimony from its ores is attended with some difficulties, owing to its volatility and affinity for oxygen. If the sulphide is much mixed with veinstone, such as quartz, it is subjected to the preliminary process of liquation, by which the fused sulphide flows away, leaving the rock behind. The sulphur is extracted either by heating with iron, alkalies, and charcoal, leaving a regulus of metal, or by oxidation, leaving the antimony in the condition of teroxide, which is afterwards reduced with charcoal and alkalies in crucibles. The metal sinks to the bottom, and the overlying residue is known as crocus of antimony.

Cobalt.—The method employed for extracting cobalt oxide from the ore varies according to the richness of the ore and the impurities with which it is mixed. In Germany ores rich in cobalt are found in small quantities but sufficient to work profitably for cobalt independent of nickel. Such rich arsenical ores were formerly simply roasted in the air, giving an arseniate of cobalt which found its way into the market as "zaffre." But as the cobalt ores frequently contain considerable amounts of nickel and iron, an additional step was necessary before a compound of cobalt could be produced of sufficient purity to give a good blue color to glass and fill the other requirements. The roasted ores are fused with carbonate of lime or some other flux, when the iron flows on the surface as a slag, leaving a heavy speiss of cobalt below. In this fusion the cobalt is partly oxidized, but the nickel remains for the greater part as sulphide. This speiss is then fused with a mixture of white sand and potash. The fusion is effected in large earthen pots, arranged in a furnace similar to that employed for the manufacture of plate glass. The arsenides of nickel, residual iron sulphide, and copper sulphide sink to the bottom of the pot, and the blue glassy substance on top, which contains the cobalt, is ladled out into water. This blue glass is called "smalt." It varies in composition according to the different quality of the cobalt ores used for its preparation, and also according to the amount of sand and potash with which it is fused. It is a silicate of cobalt and potassium in which the amount of silica varies between 56 and 70 per cent., that of potash between 12 and 22 per cent., and that of cobalt between 6 and 16 per cent. In addition smalt contains small quantities of alumina, ferric oxide, and frequently also lime and oxide of lead ; the commoner kinds also contain oxide of nickel. As sent into the market it is in the form of a blue powder.

At Mine la Motte, in Missouri, no cobalt is made into the usual form of oxide, but the nickel and cobalt are worked into a matte which is shipped to Europe for further treatment.

Chlorination Processes.—During the past few years a large number of methods for extracting metals from ores by the chlorination process have been patented.

Drouin's process consists in extracting, by wet treatment and at a low temperature, lead, silver, nickel, copper, and cobalt from all ores or mattes which contain them. This process it is claimed admits of the extraction and the separation in a pure state of all these metals—lead, silver, copper, nickel, and cobalt—which may be found combined in the same ore, or in matters resulting from smelting operations, etc., and it is claimed to be equally applicable to the treatment of ores, of mattes or slag, and to the extraction of the metals named from slimy residues, resulting from the mechanical preparation of ores containing such metals. These residues are in the condition of a fine powder, and are too poor to be available by smelting or other similar operations. The metals contained in the ores and in the mattes are chloridized at a low temperature by means of a solution of sea-salt obtained by evaporating sea-water, and of an acid in variable proportions, according to circumstances. When the ore contains lead the treatment must be accompanied by heat.

The operation is conducted in wooden vats having a false bottom provided with a filter, and on which the pulverized ore is placed. The layer of ore may vary from 16 to 20 inches. The dissolving liquid is placed in a reservoir on a higher level than the filter-vat, and is conducted into the vats by means of lead pipes ; but when the treatment is to be accompanied with heat amounting to from 176° to 194° Fahr. the mixture of the liquor and the ore is heated with steam by means of any appropriate arrangement. When the ores do not contain either lead or silver the extraction of the metals is always effected without the aid of heat.

The ores and mattes should be reduced by any appropriate grinding apparatus to a fine powder and then roasted, especially if copper, nickel, and cobalt are to be extracted. This should be done at a low temperature (from 750° to 1000° Fahr.) in an oxidizing atmosphere. The composition of the liquor by means of which the metals are chloridized, chlorinated, or treated, and the solution of the chlorides thereby formed, vary according to the nature and the composition of the ores. By "chlorination" is meant the lixiviation of the ores by solution of any soluble chloride acidified by any kind of acid. Generally speaking the liquor should contain from 20 to 25 per cent. of salt and from 1 to 10 per cent. of acid. The dissolving liquors may be re-employed indefinitely after each precipitation.

Since the solution of lead is effected only with the aid of heat, it is merely necessary to allow the liquor to cool off after the silver has been extracted therefrom, and then all the lead separates itself in the shape of small crystals of chloride, which are white and very easy to collect. After cooling the copper is precipitated by means of iron. If the ore contains nickel or cobalt the solution from which the copper has been separated is submitted during two hours to the action of a current of chlorine for the purpose of peroxidizing the metallic salts, or of forming chlorides of these metals. Then the iron is precipitated by means of carbonate of lime. The nickel and the cobalt are then precipitated in the filtered liquor in the shape of oxides of nickel and of cobalt by means of caustic lime. The separation of the two oxides is effected by any of the known processes. The sulphurets of nickel and cobalt are roasted for the purpose of driving out the sulphur and of furnishing pure oxides.

The use of chlorine can be avoided by precipitating together the iron, the nickel, and the cobalt by means of an alkaline sulphuret. The separation of the iron is easily effected by submitting the mixture of sulphurets to the action of a diluted solution of hydrochloric acid in water. In this case chloride of iron is produced, which can be utilized instead of a chloride of sodium for dissolving metals under the conditions above mentioned.

The washing of the metals or of precipitated oxides should be rapidly done and with an abundance of water, in order to free them of the salts with which they are impregnated. The drying of the metals is effected without the assistance of heat in order to avoid oxidation. For this purpose a hydraulic press or a centrifugal machine is made use of. The precipitated silver is reduced in a crucible, and the remaining metals in a reverberating furnace.

The chloride of lead obtained by this process it is stated always contains 73 per cent. of metallic lead, and it can be made use of for manufacturing oxides or salts of lead. The metal can also be extracted from the same by fusion with coal and limestone.

Either hydrochloric acid or sulphuric acid may be employed for preparing the dissolving liquid, and the results obtained are identical in both cases. When hydrochloric acid or sulphuric acid is employed, the mixture is in the presence of oxidized ores, and chlorine is emitted, hence the use of the word "chlorination" or "chloridizing" for this method. If sulphuric acid is employed, metallic chlorides and sulphate of soda are produced. If the ores contain gold, it is dissolved, and chlorine alone can produce this solution. Chloride of sodium is not the only salt that produces the reactions indicated. Many soluble chlorides, in the shape of an acid solution, by means of any acid, produce the same phenomena. Sea-water acts as efficaciously as chloride of sodium. It is merely necessary to concentrate it to such extent that it contains about 25 per cent. of salt. If the sea-water were employed without being concentrated, the reactions would take place too slowly to be considered industrial and profitable.

This process is said to be applicable to the extraction of silver from all ores, whether refractory or not, and also to the extraction of lead, copper, nickel, and cobalt. Many advantages result from the use of this process. Besides the perfect purity of the products, the amount of acid consumed never exceeds the quantity necessary. Since the dissolving liquid can be used a great number of times, the cost of extraction of the metals is relatively small. The waste liquors left after practising Drouin's process may be re-employed without any previous preparation or purification.

Hubbard's process has for its object to secure the production of gold, silver, and copper free from lead. It consists in using a leaching solution containing in addition to the hyposulphite a soluble carbonate—such as sodium, potassium, or ammonium carbonate—which changes sulphate and chloride of lead, which would otherwise be dissolved by the hyposulphite solution, into carbonate of lead, which is insoluble in the hyposulphite solution, without, however, interfering with the usual dissolution of the chlorides of silver, gold, and copper.

The usual means for leaching consist of, first, one or more tanks containing a solution of a hyposulphite in water; second, tanks or tubs for leaching the ore, the tanks being provided with false bottoms of canvas or matting, which act as filters; third, precipitating tanks into which the solution or filtrate is conducted after it has dissolved the soluble compounds of the metals out of the ore.

In the process of leaching the ore, tanks are filled about two-thirds full of pulverized ore. Then, if the ore has been artificially chloridized, water is turned on the ore and allowed to filter through and run to waste, carrying with it certain compounds—such as sodium sulphate—which are by-products of the chlorination process and are not worth saving. After these worthless compounds have been dissolved out of the ore, it is leached with the hyposulphite solution. This solution has the property of dissolving the chlorides of gold and silver, and also chloride of copper. Unfortunately, however, the solution also dissolves chloride and sulphate of lead, which is highly objectionable, as the presence of lead in the gold and silver bullion renders the refining of that bullion a very expensive operation. After passing through the ore, the solution containing the gold, silver, copper, and lead is conducted into the precipitating tanks, when a precipitating agent is added, this agent being usually a sulphide of an alkali or alkaline earth, which converts the compounds of gold, silver, copper, and lead into insoluble sulphides. These are allowed to settle to the bottom of a tank, and the solution is then drawn off and returned to the solution tanks to be used again. The sulphides are collected, dried, and roasted to expel a portion of the sulphur. They are then heated in crucibles to remove the remainder of the sulphur, and in this way are reduced to the metallic state and then cast into bars. This bullion is usually of a low grade, on account of the lead which it contains. In order to remove this objection Hubbard adds to the leaching solution containing the usual amount, 1 to 3 per cent. of hyposulphite, from 5 to 2 per cent. of either carbonate of soda, carbonate of potassium, or a carbonate of ammonium. Either one of these carbonates will convert lead sulphate or chloride into carbonate of lead, which is insoluble by the hyposulphite solution. On the other hand, the compounds of gold, silver, and copper are dissolved as usual. Consequently under this process the gold and silver and copper compounds pass out of the ore in the hyposulphite solution, leaving the lead behind in the ore. The gold, silver, and copper bullion, therefore, contain no lead.

For other details of metallurgical operations see the various metals. (C. T. D.)

METALS. This article is confined to the metals of commercial importance in the United States, and gives a summary of their production with recent statistics. Further information will be found under the various metals and in the article on Metallurgy.

See Vol. XVI. p. 68 Am. ed. (p. 63 Edin. ed.).

Copper.—Although well known and long worked by the aborigines, particularly in the Lake Superior district, copper mining did not become a regular industry in the United States until a comparatively late date, considering the wide distribution of the metal in this country. The earliest record of regular operations refers to the working of the Schuyler mine near Belleville, N. J., discovered in 1719, the ore being shipped to England, although a company was incorporated as early as 1709 to work the Simsbury mine near Granby, Conn. In Pennsylvania the Gap mine was opened in 1797. Comparatively small quantities were obtained from the beginning of this century, until the opening of the Lake Superior district, in Vermont, Connecticut, Pennsylvania, and New Jersey. In what is now New Mexico, the Santa Rita de Cobre mine was opened in 1804, and is said to have produced very large quantities of metal from 1828 to 1835, a statement of some interest since the great development of production in the South-western Territories. The industry can, however, hardly be said to have obtained a status until the mines of Michigan were regularly developed. The Jesuits and the early voyageurs and explorers knew of the existence of copper, and in 1770 an English company was organized by Alexander Henry to make the first of two unsuccessful attempts at mining work. In 1796 Captain Jonathan Carver again called attention to the region, and in 1320 H. R. Schoolcraft, who had accompanied Gen. Lewis Cass on a tour of inspection in 1818 and 1819, again dwelt on the mineral resources of the country. It was only in 1842, however, that James Paull, of Ontonagon, removed the first mass of native copper, which is now in possession of the War Department at Washington. In 1841 Dr. Douglass Houghton, State geologist, submitted the first results of his investigation, and his report did more than anything else towards awakening an interest in the region. Cessions by the Chippewas soon after opened the country to settlement, and a "copper fever" developed which reached its climax in 1846, when the speculative mania collapsed. The majority of the new ventures had a checkered career, but the phenomenal success of a few, like the Cliff, and later the Minnesota, kept up the hopes of the miners, until during the war high prices for the metal made mining more remunerative. A steady improvement in the methods of crushing made work on ores hitherto not available profitable. While in the early days success depended chiefly on the discovery of large masses of native copper, in some instances weighing hundreds of tons, the period of 1860 to 1865 witnessed a change toward greater production from veins carrying, with a fair degree of uniformity, small globules of the metal, the percentage varying between 0.75 to 4.75 per cent. of metallic copper. An era in the history of mining is marked by the opening of the Calumet and Hecla mines in 1865. Since then their operations have extended steadily, until now they produce more than half of the copper obtained from the Lake Superior mines. The introduction of power drills, high explosives, and improved crushing and dressing appliances was steady, and sustained and kept the Lake Superior mines so far in the van that between 80 and 90 per cent. of the total yield of the country, till 1880, was credited to the district. During that time, for many years a moderate quantity of copper was mined at Ely, Vt., and for a brief and fairly brilliant period at Ducktown, Tenn. In the Rocky Mountain States and Territories the early history of copper mining is characterized by a short-lived excitement over the mines at Copperopolis, Cal., and by some operations in New Mexico and California. It was only when the extension of the railroad system in the southern tier of Territories made the receipt of materials and supplies and the shipment of product possible that copper mining was given any attention. The Longfellow mines at Clifton, Arizona, were located in 1873, but the development was gradual until 1880, when in rapid succession a number of large and rich deposits were opened, with phenomenal success in some instances, stimulating investments which culminated in 1882. Meanwhile another district had gradually come into notice, developing with a rush, until in 1885 it turned out a quantity of copper closely approaching that of Lake Superior. The mines in Butte, Montana, have a record for enormous bodies of rich though impure ores, rivalled only by the great deposits of the early days of Chili. Before 1880 the quantity of copper produced was small; in 1882 it reached 9,058,284 pounds; rose to 24,664,346 pounds in 1883; nearly doubled in the next year, and reached 67,797,864 pounds in 1885, a record unparalleled in the whole history of copper mining. The United States now occupy the first rank among the copper producers of the world, and besides providing for a very large home consumption, furnish to the markets of the world quantities very nearly equal to those exported from Chili and from Spain. The following table shows the increase in the production during the last few years:

Copper Production in the United States in recent years.

Source.	1883.	1884.	1885.
	Pounds.	Pounds.	Pounds.
Lake Superior	59,702,404	69,353,202	72,148,172
Arizona	23,874,963	26,734,345	22,706,366
Montana	24,664,346	43,093,054	67,797,864
New Mexico	823,511	59,450	79,839
California	1,600,862	876,166	469,028
Colorado	1,152,652	2,013,125	1,146,460
Utah	341,885	265,526	126,199
Wyoming	962,468		
Nevada	288,077	100,000	8,871
Idaho	....	46,667	40,381
Missouri	260,306	230,000	
Maine and New Hampshire	212,124	249,018	211,602
Vermont	400,000	655,405	
Southern States	395,175	317,711	40,199
Middle States	64,400	2,114	190,641
Desilverizers, etc.	782,880	950,870	910,144
Total domestic copper	115,526,053	144,946,653	165,875,766
From imported pyrites and ores	1,625,742	2,858,754	5,086,841
Total	117,151,795	147,805,407	170,962,607

This rapid increase has led to a corresponding decline of the price of the metal in all markets, and has made the United States the aggressor in the fiercest struggle for leadership among the producing regions of the world yet witnessed. That contest is now drawing to a close, with the producers of this country in a recognized position. The principal sections which contribute to foreign markets are the Lake Superior and Montana, the former shipping the purest ingot metal known, and the latter chiefly a furnace product, usually very impure. The exports of 1885 are estimated at about 86,000,000 pounds. The low price has stimulated consumption here, reports from a number of the largest manufacturers of copper and brass indicating an increase of 16 per cent., which it is estimated carried the copper consumption of the United States in 1885 to 90,000,000 pounds.

Lead.—The lead deposits of the United States attracted attention at a very early date, Le Sueur having noted them in his voyages on the upper Mississippi as early as 1700 and 1701. Soon after, in 1720, the first mining operations were commenced in Missouri under the authority of a patent granted to Law's famous company, but it was not till 1798 that regular work was done at Mine La Motte, which is still a regular producer. Joseph Dubuque, a French miner, began work on the upper Mississippi in 1788, continuing mining till his death, in 1809, near the city now bearing his name. In Illinois the lead mines were discovered at the time the city of Galena was first settled, by Bouthillier, and from 1840 to 1850 the greatest degree of prosperity was reached. The United States from 1840 to 1848 became quite heavy exporters of lead. For nearly four decades, from 1830 to 1870, the output, confined almost entirely to the Missouri, Iowa, Illinois, and Wisconsin surface deposits, fluctuated between comparatively narrow limits, subject to the vicissitudes of the uncertain deposits and the condition of the markets.

A proof of the uncertain character of the output of some of these districts is furnished by the figures covering the record of the upper Mississippi mines. During the decade of 1821 to 1831, the average annually was 2324 tons. It rose to 5572 tons in the decade following, and attained its maximum from 1841 to 1851, when the annual average was 21,598 tons. It fell to 16,133 in 1851 to 1861, to 8470 in the period of 1861 to 1871, to about 4500 tons as the average of 1871 to 1881, and now the production has practically ceased. Some work was done in a number of the New England and Middle States, and there is a record of an attempt, as early as 1740, to mine lead at Northeast, Dutchess county, N. Y., by Germans. The output on the Atlantic coast was never more than insignificant, and is now confined to the production of a few hundred tons in Virginia. A formidable rival of the mines of the Mississippi Valley arose, however, through the rapid development of the Eureka district in Nevada in 1870, when large bodies of ores rich in silver and lead yielded a large profit. In 1878 the district reached its maximum product, 31,000 tons, and since has steadily declined. In the same period the Utah mines were opened, they too becoming accessible through the completion of the transcontinental railroad.

In 1878 Leadville was discovered, and with unparalleled rapidity a great industry was created. The maximum of output—39,864 tons of lead and shipment of 22,416 tons—was attained in 1882. Although in the brief period of fifteen years the economic conditions affecting the smelting of lead ores have changed until today the base metal is merely a carrier of silver and gold, and although ores much poorer in lead have thus become available, the rapid exhaustion of the great deposits has brought about a decline in the production, which new discoveries have not been able to counteract. Colorado is now the leading producer, followed by Utah, Idaho, New Mexico, and Montana. Specific figures showing the source of the lead produced by the Rocky Mountain States and Territories cannot be given, because there is so active an interchange of ores between them that it is impossible to trace the product.

The last effort made in that direction was carried out in 1884 by the U. S. Geological Survey with the following results:

Lead Production in the United States in recent years.

Source.	1883.	1884.
	Short tons.	Short tons.
Utah	29,000	28,000
Nevada	6,000	4,000
Colorado	70,557	63,165
Montana	5,000	7,000
Idaho	6,000	7,500
New Mexico	2,400	6,000
Arizona	1,500	2,700
California	1,700	1,600
Missouri, Kansas, Illinois, and Wisconsin.	21,600	19,676
Virginia	200	256
Total	143,957	139,897

The difficulties of tracing the source of the lead produced in the different States and Territories has since grown to such an extent that the statisticians of the Geological Survey abandoned the attempt in 1885.

Until recent years all the ores worked in the Rocky Mountains contained considerable quantities of silver, while the deposits of the Mississippi Valley carry amounts of that precious metal too small to be recovered with profit. In the Rocky Mountains growing quantities of refractory silver ores are being treated simultaneously with lead ores by smelters. Thus the lead has gradually become merely a means of aiding the extraction of silver, and often plays the function now which quicksilver assumes in the amalgamation process. This change has raised the value of the metal to smelters in an arbitrary manner, and in some sections, like Leadville, has led to paying more for it in the ore than can possibly be realized for it in the market, after paying for freights, refining charges, and marketing expenses. In spite of this fact, the production of lead in the United States fell off during 1885 to the amount of 10,000 tons.

IRON.—A number of circumstances have contributed to identify the early history of iron-ore mining with that of the primitive furnaces and forges of the last century. The fuel then exclusively used was charcoal, available in almost every section of our country. The markets were limited and scattered and facilities for transportation poorly provided. Therefore the early iron-works were invariably located near the ore supply, and the quantities mined were comparatively insignificant. The first iron ore was mined by the Virginia Company of London in 1607, near Jamestown, Va., and was shipped to England in 1608. The first iron-works were begun in 1619 by the same company, the location chosen being Falling Creek, a tributary of the James River. This enterprise proved a failure. In 1645 a company of Englishmen built iron-works at Saugus Centre, near Lynn, Mass., followed by a second enterprise in 1646 at Braintree, and a third in 1652 near Taunton. The first authentic record of iron manufacture in New Jersey places the date at 1674, when work was done at Shrewsbury, while it is only in 1692 that the first mention is made of iron produced in Pennsylvania. In Maryland iron ore appears to have been mined prior to 1716, while the fact that imports of Carolina iron into England are mentioned in 1728 and 1729 shows how early were the beginnings of the industry further south. During the colonial period iron manufactures in the colonies prospered so well that they became quite heavy exporters to Great Britain, and contemporary literature proves that the fear of English iron-masters of that competition was only second to the uneasiness which they felt concerning the encroachments upon their trade on the part of Swedish producers. Until 1840 charcoal remained the fuel almost exclusively used. It is true that in 1831 Dr. F. W. Geissenhainer, a Lutheran clergyman, first patented the use of anthracite coal, and that he tried it experimentally in 1837 at the Valley Furnace in Pennsylvania. After his death George Crane and David Thomas developed this branch further, and to their exertions the revolutionary change in the fuel used is mainly due. With coke unsuccessful experiments were made as early as 1835 and 1836, but it was not till 1850 that the use of that fuel began to exert any perceptible influence upon the methods of manufacture. Meanwhile the development of the railroad system of the United States exerted a powerful influence in two directions in carrying the iron industry of the country with great strides to its present leading position. It created an enormous demand, and at the same time, by providing cheap methods of transportation, broke the fetters which tied the industry to local supplies of ores and of fuel. It made it possible to carry either or both long distances, and furnished the means of raising mineral fields from the rank of providers of local industry to the position of sources of supply of national importance. Another factor was potent in aiding this movement. The introduction of the Bessemer process brought into play new distinctions as to quality of ores, and it was soon discovered that the supply could only be obtained by reaching out to hitherto inaccessible regions for it. This is most strikingly illustrated by the history of the Lake Superior, Mich., iron-ore district. The first shipments from that quarter to Pennsylvania were made in 1850, when a few tons were used at Newcastle. In 1860 the production reached 114,401 gross tons. Ten years later it was 859,507 tons, and in 1885 the aggregate was 2,418,486 tons, including the product of the Vermillion district in Minnesota, opened in 1884, and the Agogebic district, now in the first stages of its development.

Statistics of the production of iron ore are not available, except for a few districts. The increase during the past decades is best shown by the records of the census of 1860 and that of 1880. At the earlier date the output is placed at 3,218,275 net tons, while in 1880 it was 7,974,705 net tons. For the calendar year 1884 Mr. James M. Swank estimates the consumption of domestic ore to have been 8,644,304 net tons. The same authority places the output of the leading iron-ore districts of the United States in 1883 and 1884 at the following figures :

Iron Production in the United States in recent years.

Districts.	1883.	1884.
	Gross tons.	Gross tons.
Lake Superior mines	2,352,288	2,455,924
Vermillion Lake, Minnesota	....	62,124
Missouri	295,430	233,225
Cornwall, Pennsylvania	363,143	412,320
Chateaugay mines, near Lake Champlain, New York	194,704	214,394
Lake Champlain mines	305,300	290,500
New Jersey	521,416	393,710
Salisbury district, Connecticut	35,000	25,000
Hudson River Ore and Iron Co., N. Y.	20,000	90,000
Total	4,087,281	4,177,197

These figures embrace about one-half of the total estimated consumption.

The report of the select committee of the Senate on ordnance and war ships contains a paper on Bessemer Ores by Albert Williams, Jr., chief of the division of mining statistics of the U. S. Geological Survey. It contains a statement, compiled for the census of 1880 by Profs. Raphael Pumpelly and Bayard S. Putnam, not published until then, which conveys some definite information concerning the quantity of iron ore mined in the United States in 1880 which may be considered to come within the classification of Bessemer ore, that is, ore suitable to produce pig-iron sufficiently pure to make Bessemer steel. The line is drawn at ore which, if smelted alone, will produce pig-iron containing not more than .01 per cent. of phosphorus.

States.	Magnetite. Net tons.	Hematite. Net tons.	Limonite. Net tons.	Total. Net tons.	Per cent.
Maine	....	....	6,000	6,000	0.28
Michigan	47,300	821,234	80,055	948,589	44.88
Missouri	....	287,980	....	287,980	13.60
New Jersey	114,841	....	....	114,841	5.43
New York	336,016	....	24,805	360,821	17.07
North Carolina	2,750	....	112	2,862	0.14
Pennsylvania	331,350	....	49,258	380,608	18.01
Tennessee	....	....	5,600	5,600	0.27
Virginia	....	3,360	2,800	6,160	0.29
Total	832,257	1,112,574	168,630	2,113,461	
Per cent	39.38	52.65	7.97	100.00	

The recent introduction of the Clapp-Griffiths process, while not robbing the distinction between Bessemer and non-Bessemer ores of any of its significance, seems likely to make available for the commoner grades of steel a much wider range in quality of ore.

During the past few years the abundant and numerous ore deposits of the Southern States have attracted growing attention. The economical questions relating to their utilization have been the subject of much controversy and of very sanguine predictions, largely coming either from parties interested in the sale of lands or from persons not qualified to speak on the complex matters involved. It may be stated as reflecting the opinion now held, after thorough investigation by trained and disinterested observers, that the great advantages offered by an abundant supply and the close proximity of ores and coal, and of cheap labor, are to some extent counterbalanced by the mediocre quality of both ore and coal and by the distance to market. Yet it is conceded that the Southern iron industry will occupy a much more prominent rank among the producing sections of the country than it has even now conquered.

The consumption of iron has been carefully studied by the American Iron and Steel Association, whose secretary, Mr. James M. Swank, has reported the following figures for the year 1884 :

States.	Domestic ore.	Foreign ore.	Total gross tons.
New England	42,160	....	42,160
New York	424,429	9,562	433,991
New Jersey	127,179	1,918	129,097
Pennsylvania	3,529,433	425,488	3,954,921
Maryland	62,881	600	63,481
Virginia and N. Carolina	321,542	....	321,542
Georgia	89,730	....	89,730
Alabama	392,304	....	392,304
Texas	9,543	....	9,543
West Virginia	72,213	....	72,213
Kentucky	92,186	....	92,186
Tennessee	278,260	....	278,260
Ohio	895,135	1,615	896,750
Indiana and Illinois	427,282	....	427,282
Missouri	89,219	....	89,219
Michigan	243,810	....	243,810
Wisconsin and Minnesota	78,995	....	78,995
Colorado	24,023	....	24,023
Pacific States	13,440	....	13,440
Total	7,213,764	439,183	7,652,947

The average quantity of iron ore required to produce a ton of pig-iron has varied in the following manner in the different States :

States.	Tons of ore.	States.	Tons of ore.
New England	2.4	Kentucky	2.29
New York	2.02	Tennessee	2.31
New Jersey	1.9	Ohio	1.76
Pennsylvania	1.83	Illinois	1.45
Maryland	2.6	Missouri	1.66
Virginia	2.28	Michigan	1.57
Georgia, Ala., and N. C.	2.32	Wisconsin	1.66
Texas	2.07	Colorado	1.69
West Virginia	1.46	Pacific States	2.38
		Average for the United States	1.87

It must be distinctly stated that these figures indicate the variations in the grade of the ore at the point of consumption, and that they furnish no data immediately available to ascertain the relative grades of the ores mined in the different States, because there is an active interchange of ore, and because the richer and purer kinds can bear longer transportation, and, as in the case of the Michigan product, raise the percentage of a number of States. Roughly, it may be asserted that the furnace-men of the United States use richer ores than those of other countries. Thus the average percentage of iron in those smelted in 1884 in the United States was 53.4 per cent. against 35.8 per cent. in the raw coal-furnaces of Great Britain in 1882, 37.8 in the coke-furnaces of France in 1882, and 40.4 per cent. in the coke-furnaces of Germany in 1882. It does not follow from these figures that the ores of the United States are richer, but that in the other countries named leaner ores can be profitably smelted.

Silver.—Silver mining is very largely associated with the mining of other metals, so that in a number of instances its history in some districts is identical with that of lead, copper, or gold. Conspicuous examples of interdependence is furnished by the development of the lead mines of the Eureka district in Nevada, the Utah lead deposits, the Leadville carbonates, and latterly the Wood River mines in Idaho. Native silver in comparatively small quantities accompanies the native copper of Lake Superior. Argentiferous copper ores are found in Arizona, and the recently developed copper mines of Butte, Montana, carry varying quantities of the precious metal. The Comstock lode, Nevada, though generally spoken of as a great silver vein, for many years yielded bullion the value of which was nearly equally distributed between gold and silver. Previous to the discovery of that deposit only small and comparatively insignificant mines were worked with fluctuating success. Although so widely distributed in the Rocky Mountains, outside of California, the metal attracted little attention among those who ventured far beyond the confines of the State in which gold was first obtained in their search for that metal. In the summer of 1850 gold was first discovered on Gold Creek, a tributary of the Carson River, Nevada, by Mormons, and in the following years the gravel was worked with good success by the primitive methods then known. The district, however, had begun to show strong evidence of decline in yield after 1855, when two brothers, Ethan Allen and Hosea Ballou Grosh, sought their fortunes there. They were the first to notice the existence of a silver lead in Gold Cañon. Impressed with its importance they returned again and again to that locality to prospect on the vein. Letters written in 1856 and in 1857 place beyond any doubt their claim to the first discovery of what has since been shown to be the greatest bonanza opened in this century. Late in the summer of 1857 one of the brothers died from the effects of an accidental injury, and in the winter the other perished from exposure on a trip to California. In February, 1858, James Finney claimed a ledge on the hills north of Gold Cañon. In the winter of 1858–59 he, with four others, located claims near the same spot. He was followed a few days later by Henry Comstock and four associates, and in the spring of 1859 considerable metal was taken out by placer washing. Soon after the great lode was cut again by two prospectors, James O'Riley and Patrick McLaughlin. Comstock, whose name has been definitely associated with the lode, did not have a shadow of a claim to the title of being its discoverer. The location of claims followed in rapid succession in June, 1859, and when in July the announcement of the discovery of rich silver mines was made throughout the camps of the Pacific coast, prospectors began to flock to the new locality in great numbers, though little development ever was done. Comstock sold out his interest for $11,000, and in the spring of the following year few of the original holders of the first locations on the Comstock lode retained their shares. Some rich ore had been reduced in arrastras and had been shipped to San Francisco in 1859. Large sums of money were squandered upon worthless plots of ground, and the gambling fever ran high, to be checked by a reaction in April, 1860. One of the early feats in the history of silver mining on the Comstock lode was the building by Almarin B. Paul of the first mill for crushing the rock and extracting the precious metals in the unprecedently short time of 60 days. It was successful from the start, Aug. 11, 1860.

In the meantime the developments in some of the mines, notably the Ophir, had been wonderful. The width of the ore body increased to such an extent in depth, reaching 65 feet in width, that it became a matter of serious embarrassment how to extract the ore without a general caving in of the mine. This trouble was overcome by the method of timbering introduced by Philip Deidesheimer. In the same year began the consolidation of numerous individual claims in the hands of stock companies. This was followed by a long period of litigation, which, with the heavy sums paid out for mining and for milling and wasted by extravagant and ignorant management, left little of the receipts for ore and bullion for distribution as a profit. It is estimated by the best authorities that from 1860 to 1866 the cost of litigation was $10,000,000.

In 1863 and 1864 the leading producing mines were sorely troubled by the influx of water, some of them being repeatedly flooded. In 1865 Adolph E. Sutro obtained from the Nevada legislature an act approving the incorporation of the Sutro Tunnel Company, to drive an adit about 20,500 feet long to cut the lode at a depth of 1663 feet below the level of the nearest mine shaft—that of the Savage Mining Company. While Sutro was struggling to put through his scheme against the opposition of a number of the companies, the water became more and more troublesome, and the yield of the mines fell off in 1869 to a little more than one-half the product of 1867, with signs of further diminution. In 1870 the entire exhaustion of all the rich deposits in the bonanza mines then known, but one, had either taken place or was imminent. The prospects for the future on the Comstock lode darkened until, in the spring of 1873, the owners of the Virginia Consolidated Mining Company —Mackay, Fair, Flood, and O'Brien—struck the great bonanza at a point 1167 feet below the surface. How great was the product of this, the last discovery of a large body of ore, may be gathered from the fact that from 1873 to 1878 the Virginia produced $60,732,882.63 in gold and silver, paying out, from May, 1874, to August, 1879, $42,120,000 in dividends; and the California, the adjoining mine, yielded $43,727,831.06, and distributed $31,050,000 in profits in the same time. From the time of the discovery of the lode till Jan. 1, 1881, when its second period of prosperity had ended, the total yield was $306,000,000, out of which $116,000,000 had been paid in dividends, while the assessments aggregated $62,000,000.

The success of the early prospect work on the Comstock lode gave an impetus to the search for silver in other parts of the Rocky Mountains, and from time to time rushes were made to outlying districts, the first being, in the spring of 1863, to the Reese River region or the Toiyabe range, in which a number of camps were founded, some of them having a brief career of prosperity. In later years followed the opening of numerous mines in Nevada, Utah, Arizona, Montana, and Idaho, some of them, like the Eureka mines and the Leadville deposits, being closely associated with the extraction of lead. Eureka has seen its best days years ago, Leadville has settled down to a regular routine, the Tombstone district in Arizona seems to have exhausted its rich surface deposits, and the Butte mines are steadily producing from medium-grade ores, refractory in their character, considerable quantities of silver.

Territorially distributed, the production of the past few years has been as follows, according to the reports of the director of the mints:

States and Territories.	1881.	1882.	1883.	1884.
Arizona	$7,500,000	$7,500,000	$5,200,000	$4,500,000
California	750,000	845,000	1,460,000	3,000,000
Colorado	17,160,000	16,500,000	17,370,000	16,000,000
Dakota	70,000	175,000	150,000	150,000
Georgia	....	....	1,000	
Idaho	1,300,000	2,000,000	2,100,000	2,720,000
Maine	5,000			
Montana	2,630,000	4,370,000	6,000,000	7,000,000
Nevada	7,060,000	6,750,000	5,430,000	5,600,000
New Mexico	275,000	1,800,000	2,845,000	3,000,000
North Carolina	....	25,000	3,000	3,500
Oregon	50,000	35,000	20,000	20,000
South Carolina	....	....	500	500
Utah	6,400,000	6,800,000	5,620,000	6,800,000
Washington	....	....	500	1,000
Other	....	....	....	5,000
Total	$43,000,000	$46,800,000	$46,200,000	$48,800,000

The most famous mine for persistency of a large body of high-grade ore, yielding very large profits, is the Ontario, near Park City, Utah, which is finding a younger rival in the Daly mine, adjoining it. For some years no startling discoveries have been made in the silver-mining regions of the Rocky Mountains, but the product is kept fairly steady through the large number of active mines, many of which are running, with a moderate profit, on large bodies of low-grade ore, whose remunerative working calls for the exercise of the greatest skill in mining and in metallurgical methods.

Gold.—We possess only vague and unsatisfactory allusions concerning discoveries of gold in the United States during the first centuries of its history. The annals of Virginia record an excitement over the supposed discovery of gold in that colony, but a ship-load of the ore forwarded to England was pronounced mica or pyrites by London jewellers. Jefferson, in his *Notes on Virginia*, mentions the finding of a lump of gold near the Rappahannock, and in 1799 the famous Cabarrus nugget, weighing 28 pounds, was discovered at the Reed mine in North Carolina. From the beginning of this century until 1824 only small amounts were obtained; they increased in the next four years, but it was not till the summer of 1829, when the first discoveries of gold were made in Habersham co., Ga., that the subject attracted so much attention as to become the stimulus for a great though short-lived gold excitement. The production of this precious metal seems to have reached its maximum in the period from 1829 to 1845, the output in some years going above $1,000,000.

A new era in American mining was inaugurated by the discovery, or, rather, the rediscovery of gold in California. Its existence was undoubtedly well known to the Jesuit fathers, who, however, did all in their power to discourage the search for it. In the southern part of the State it was found as early as 1842 by Francisco Lopez at San Francisquito, near Los Angeles; and Duflot de Mofras has recorded the fact that Baric, a Frenchman, worked gold-bearing quartz near the mission of San Fernando in 1843. There is evidence, too, that a number of Sonorians extracted the metal from placers for a while until disturbed by the breaking out of the Mexican war. The discovery which led to the unprecedentedly rapid exploration of the auriferous area of the Pacific slope was made on Jan. 18, 1848, at Sutter's saw-mill, on the southern fork of the American River, Eldorado co., Cal., by James W. Marshall. On March 15, 1848, a San Francisco newspaper contained a paragraph giving the tidings, and two months later its publication was suspended, because its entire staff, imitating their fellow-citizens of every class, had gone off to the diggings. On the commencement of the dry season of 1849 immigration began on a large scale, the counties on the Pacific coast furnishing the heaviest contingent at first, followed by heavy arrivals by sea from the Atlantic States in July and August, 1849, while the overland emigration began to pour in early in September of the same year. In 1850 the population had risen to fully 100,000 souls, and it is estimated that in the years 1848, 1849, and 1850 fully $90,000,000 were washed from the brooks and rivers of the new El Dorado. Working first with the ordinary pan, then adopting the cradle and rocker, the sluice, introduced from Georgia, came into general use in 1850 and 1851. The superficial deposits, accessible by ordinary hand-labor and crude appliances, were soon exhausted. It was about 1850 that the construction of long ditches was begun, thus bringing about the first step toward the development of that characteristically American method for the working of large deposits of auriferous gravel called "hydraulic mining." The first to take advantage of the power of water, under a heavy head, to wash down large quantities of gravel, was Matteson, at American Hill, Nevada co., Cal.

From California on the one side, and from the plains on the other, hardy prospectors penetrated into the valleys and gulches of nearly every part of the Rocky

Mountains. The placers of Oregon were opened in 1852, and gold was discovered in Idaho in the same year, though active work did not begin until 1860 at the Oso Fino mines, and until 1862 in the Boise Basin. Colorado had its "rushes" in 1859, and Montana in 1860, but in every case the superficial placer deposits in contemporaneous water-courses were very rapidly exhausted. Among the more recent gold excitements are those of the Black Hills, in Dakota, and the Cœur d'Alene district in Northern Idaho.

The richness of some of the placer and gravel deposits was phenomenal, and yields as high as $15 per cubic foot over large areas are on record; a statement which will be appreciated when the fact is noted that with modern methods of hydraulic mining 5 cents per cubic yard is considered high enough to cover costs, when conditions are generally favorable. The shallow placers of California were soon exhausted, and the bulk of the product has since then been obtained from ancient channels, whose alluvial deposits are in some cases over 100 feet thick, and the exploration of which gave rise to hydraulic mining. The latter involved the construction of a series of ditches, the flumes clinging now along the vertical walls of gorges, piercing mountains, crossing valleys by large iron pipes, and in some instances bringing water 100 miles. With a head of as much as 400 feet, 9-inch streams of water are hurled against the banks of gravel-beds, which melt away before them. Enormous dams were built to accumulate supplies of water. In spite of all efforts, by grand works, involving the outlay of very heavy sums of money, the product of the placer and hydraulic mines of California declined steadily. By persistent agitation, and after a long period of litigation, the agricultural interests of the State succeeded in obtaining a decision in the débris cases in 1884, enjoining the hydraulic mining companies from working the gravel deposits unless they make satisfactory arrangements to impound the débris before it reaches the lands in the agricultural district. This has forced the majority of the large mines to stop work for the present, although large areas of workable ground are still known to exist.

A second source of gold is the veins of quartz, which may be regarded as the original deposits. Quartz mining and the extraction of the gold by crushing with mercury in stamp-mills was begun in Grass Valley, Nevada co., Cal., as early as 1850, and the number of stamps in operation throughout the gold-fields rapidly increased to upwards of a thousand. A reaction followed, but in 1859 there were as many as 2600. A number of districts rose to prominence, but success varied, because the high cost of labor and materials made operations dependent upon the fluctuating supplies of high-grade ores. Improved mechanical appliances, and mining on a large scale, have made it profitable to work now with profit gold ores carrying less than one-quarter of an ounce per ton, or less than $5 per ton.

The production of gold has been as follows:

Year.	Value.	Year.	Value.
1800–1847	$20,000,000	1865	$53,200,000
1848	10,000,000	1866	53,500,000
1849	40,000,000	1867	51,700,000
1850	50,000,000	1868	48,000,000
1851	55,000,000	1869	49,500,000
1852	60,000,000	1870	50,000,000
1853	65,000,000	1871	43,500,000
1854	60,000,000	1872	36,000,000
1855	55,000,000	1873	35,000,000
1856	55,000,000	1874	39,600,000
1857	55,000,000	1875	33,400,000
1858	50,000,000	1876	39,500,000
1859	50,000,000	1877	46,000,000
1860	46,000,000	1878	51,000,000
1861	43,000,000	1879	39,000,000
1862	39,200,000	1880	36,000,000
1863	40,000,000	1881	34,700,000
1864	46,100,000	1882	32,500,000

For the four years, 1881, 1882, 1883, and 1884, the production of gold has been as follows, territorially distributed:

States and Territories.	1881.	1882.	1883.	1884.
Alaska	$15,000	$150,000	$300,000	$200,000
Arizona	1,060,000	1,065,000	950,000	930,000
California	18,200,000	16,800,000	14,120,000	13,600,000
Colorado	3,300,000	3,360,000	4,100,000	4,250,000
Dakota	4,000,000	3,300,000	3,200,000	3,300,000
Georgia	125,000	250,000	199,000	137,000
Idaho	1,700,000	1,500,000	1,400,000	1,250,000
Montana	2,330,000	2,550,000	1,800,000	2,170,000
Nevada	2,250,000	2,000,000	2,520,000	3,500,000
New Mexico	185,000	150,000	280,000	300,000
North Carolina	115,000	190,000	167,000	157,000
Oregon	1,100,000	830,000	660,000	660,000
South Carolina	35,000	25,000	56,500	57,000
Utah	145,000	190,000	140,000	120,000
Virginia	10,000	15,000	6,000	2,000
Washington	120,000	120,000	80,000	85,000
Wyoming	5,000	5,000	4,000	6,000
Other	5,000	....	17,500	76,000
Total	$34,700,000	$32,500,000	$30,000,000	$30,800,000

Nickel was the metal extracted in some of the earliest mining operations in the United States, though it is probable that the ore was mistaken for silver. Gov. John Winthrop received a grant as early as 1661 to explore and mine at Chatham, Conn.; and in 1762 a German, Dr. J. Sebastian Stephanney, and others, worked in the same locality for cobalt, the metal generally accompanying nickel. The mine was reopened by Seth Hunt in 1818, by Prof. Charles U. Shepard in 1844, and again by a company in 1853, but was soon abandoned, like all of the other mines opened in New England having for their object the mining of nickel.

The most productive mine in the country is that of Lancaster Gap, Pa., wrought as a copper deposit long before the ore was treated for nickel, which does not appear to have been done previous to 1850. In 1853 works to extract the metal from the ore were established at Camden, N. J., which, in 1863, were leased, and in 1869 finally purchased, by Mr. Joseph Wharton, of Philadelphia, who has done much to develop the nickel industry in the United States. The Lancaster Gap ore is a nickeliferous pyrrhotite, containing from 1.5 to 2 per cent. of the metal, which is enriched at the mine by a preliminary fusion to a 10 per cent. matte. Nickel has been obtained in small quantity, but regularly, for a long series of years as a by-product in melting the lead ores of Mine La Motte, Mo. There have been numerous reports of the discovery of large bodies of nickel ore from different parts of the Pacific coast. These have been developed but little, and thus far have practically contributed nothing to the world's supply of the metal. The two most promising localities, so far as it is possible to judge at so early a stage in their history, are the rich arsenides of nickel of Cottonwood Cañon, Churchill co., Nev., and the abundant but low-grade silicated ores of Douglas co., Oregon. It is estimated that previous to the year 1864 the whole production of pure metal in the United States was not over 100,000 pounds. Since then, to May, 1867, the Camden works turned out 105,000 pounds, and then they reached a yield of 150,000 pounds annually. Accurate statistics of production are available since 1876, the product being as follows:

Year.	Pounds.	Year.	Pounds.
1876	201,367	1881	265,668
1877	188,211	1882	281,616
1878	150,890	1883	58,800
1879	145,120	1884	64,550
1880	233,893		

Zinc.—The zinc ores of the United States attracted attention at an early date, their first development being due, however, to the introduction of a specifically American invention, the manufacture of zinc white direct from the ore. One of the famous deposits of the world, unique as an aggregate of three rare minerals—zincite, willemite, and franklinite—was discovered at Franklin, New Jersey, and was first utilized in 1848 by the New Jersey Zinc Company. A little later the mines of the Saucon Valley, Lehigh co., Pa., were discovered, and in 1853 operations were begun, at first in the direction of the production of zinc white by the Wetherill process. These mines, which were remarkable for the purity of their ores, for many years were the basis of an important industry, and led the way in the introduction of spelter making in this country. The purity of the metal is such that considerable quantities have at times been exported to Europe, although common grades produced there were being imported here. One of the mines—the Neberroth—produced large quantities of ore from 1853 to 1876, when the heavy flow of water forced a stoppage of its working. It was noted in American mining as requiring the use of the heaviest pumping plant ever erected in this country. Now only the Saucon mine is being worked. In Virginia and Tennessee a series of deposits of fairly rich and very pure zinc ore are known, to the working of which growing attention is being given. The principal sources of the spelter produced in the United States are, however, the Western works dependent upon the ores found in conjunction with lead in Missouri, Kansas, and Wisconsin. In the early days of lead mining in Iowa, Wisconsin, and Illinois, large quantities of zinc ore were thrown away as practically worthless. Works were established in 1860 at La Salle, Ill. Later, in 1871, South-west Missouri began to produce zinc ore, and in 1878 Kansas loomed up as a source of supply. These ores are not so pure as those of the East, the metal they yield generally grading as common, but in quantity the product from them has far surpassed that of their older Eastern rivals. At one time the group of works near St. Louis took a leading position in the manufacture of spelter, but at present Kansas and the Joplin district in Missouri, and, above all, the two works at the two adjacent cities, La Salle and Peru, Ill., overshadow them in importance. Arkansas is known to possess extensive deposits of zinc ore, and an unsuccessful attempt was made to establish an industry in that State. Lack of transportation facilities has thus far rendered their utilization impossible. In the Rocky Mountains important bodies of ore are known to exist, and a few small shipments to reduction works in Illinois have been made. Heavy freights militate against that section as a source of ores, and high fuel and the absence of a local demand place manufacture of the metal out of the question for the present.

The following statistics of spelter production in net tons will best illustrate the relative importance of the different zinc-producing districts of the United States, the product of Missouri in 1885 being estimated :

	1881.	1882.	1883.	1884.	1885.
Illinois	16,250	18,201	16,792	17,594	19,427
Kansas	5,000	7,366	9,010	7,859	8,502
Missouri	2,750	2,500	5,730	5,230	4,500
Eastern and Southern States	5,500	5,698	5,340	7,861	8,082
	29,500	33,765	36,872	38,544	40,511

In the census year 1880 the production was returned as 23,239 net tons, while estimates by good authorities put the 1875 output at 15,833 tons, and that of 1873 at 7343 net tons.

Mercury.—Quicksilver was known to exist in California long before gold was found. A company was formed and mining operations begun at New Almaden as early as 1845. The metal occurs both in a native state and as cinnabar, there being a series of deposits in the Coast Range of California, many of which were the scenes of temporary activity under the inducement of high prices following the heavy demand created by the working of the Comstock silver ores. The first mine opened, the New Almaden, has been the largest and the steadiest producer, and is now practically the only one making considerable quantities annually. Next in magnitude are the New Idria, Redington, Sulphur Bank, Guadalupe, Great Western and Napa Consolidated, so far as the aggregate product since their discovery. In their earlier days the mines had the advantage of treating exceptionally high-grade ores. Thus the yield of the New Almaden was 36 per cent. in 1851, but it dropped to 20 per cent. in 1861, declined to 5 per cent. in 1871, and in 1883 fell to 2.875 per cent. The product of individual mines, and of all of them, has fluctuated within wide limits, but the general decline in the grade of the ores has been partly compensated for by a steady improvement in the metallurgical appliances, which have reached a high degree of perfection. A heavy decline in the price, partly due to a falling off in the demand, has, however, told heavily on the smaller mines, and has caused the suspension of all but a few of them. From 1850 to 1884, both inclusive, the output of the California mines has been 1,389,316 flasks of 76½ lbs. avoirdupois as compared with 3,918,784 flasks of 76 lbs. from the famous Almaden mine in Spain for the period of 1564 to 1884. Since their discovery the production of the California mines has been as follows, in flasks of 76½ lbs. :

Production of Quicksilver in California.

1850	7,723
1851	27,779
1852	20,000
1853	22,284
1854	30,004
1855	33,000
1856	30,000
1857	28,204
1858	31,000
1859	13,000
1860	10,000
1861	35,000
1862	42,000
1863	40,531
1864	47,489
1865	53,000
1866	46,550
1867	47,000
1868	47,728
1869	33,811
1870	30,077
1871	31,686
1872	31,621
1873	27,642
1874	27,756
1875	50,250
1876	75,074
1877	79,396
1878	63,880
1879	73,684
1880	59,926
1881	60,851
1882	52,732
1883	46,725
1884	31,913

Tin.—The occurrence of tin has been reported from a number of localities in the United States, and at different times great expectations for the future have grown out of such discoveries. Until now, however, the metal has been only produced in this country in an experimental way. The earliest sustained effort to prospect for tin was carried out in the Temescal range, San Bernandino co., Cal., in 1860, when some metal was actually produced, though in small quantity. Later an elaborate attempt was made to fraudulently create the conviction that stream tin existed in Missouri. In 1880 some mining was done at Winslow, Me., where the existence of tin ore was first reported by Dr. Jackson in 1869. A more serious attempt was made in 1883 to utilize the low-grade tin-stone of the Broad Arrow Mines, near Ashland, Clay co., Ala., discovered by Mr. G. W. Gesner. In the same year tin-stone was discovered in Rockbridge and Nelson counties, Va., and at King's Mountain, Cleveland co., N. C., but the mines have not yet reached the productive stage. The most important find thus far has, however, been that of the Black Hills in the Harney Peak range. There is at least one body of fair magnitude of ore carrying a promising percentage of tin. This is the deposit opened out at the Etta mine, where preparations are now nearing completion to crush the rock on a fair scale. A few hundred pounds of the metal have been smelted from picked specimens, and it is probable that in 1886 the United States will, in a modest way, enter the ranks of tin-producing countries.

(C. K.)

See Vol. XVI. p. 192 Am. ed. (p. 185 Edin. ed.).

METHODIST EPISCOPAL CHURCH. This religious body was organized in the United States of America in 1784. The followers of Mr. John Wesley at that time numbered less than 15,000, and there were only 83 itinerant ministers to meet, in the city of Baltimore on Dec. 24, 1784, for the purpose of consummating a church organization. Mr. Wesley had sent to this country Rev. Thomas Coke, D. D. LL. D., having first ordained him as superintendent, or bishop, of the Methodist societies in America. At this conference in Baltimore an Episcopal form of government was agreed upon; and Dr. Coke and Francis Asbury were elected and ordained its first bishops. In the progress of one hundred years the church not only increased in its first home, but extended into foreign countries; so that the "Methodist Episcopal Church," which was organized in the United States, has now its conferences and adherents in Europe, Asia, Africa, and South America.

Doctrine.—In doctrinal statement the Methodist Episcopal Church has not departed from the Arminian theology impressed upon it by the teachings of Mr. Wesley. It lays special emphasis upon the corruption of human nature, the completeness of the work of Christ, the conscious experience of salvation through faith, the witness of the Holy Spirit, and the perfection of believers in love.

The conditions of society were such that the liturgical forms for public worship sent over by Mr. Wesley for use in the societies, though originally accepted by the church and never formally abrogated, were never generally observed, while forms for the special services of baptism, reception into membership, marriage, the Lord's supper, burial, and ordinations are insisted upon.

Division.—From the organization of the church in 1784 until 1840 its growth was not interrupted by any secession or serious division; but at the Fourteenth General Conference in 1844 the discussion of the relation of the bishops to the question of slavery resulted in the formation of a plan of separation, under which the Methodist Episcopal Church South was organized. This body has continued as a successful independent organization, now having 4045 itinerant and 569 local preachers and 877,299 members.

Government and Administration.—The legislation of the church is centred in a *General Conference*, which meets once in four years; and is composed of *clerical delegates* elected by the annual conferences, one being allowed for every 45 members, and two *lay delegates* from each lay electoral conference. To this general conference is intrusted all legislation, and also the election of the bishops, book agents, editors, and secretaries of its different boards.

There are 106 *Annual Conferences* in which the ministers assemble for the adjustment of the work within the territorial limits of the conference. At each session of an annual conference one of the bishops presides, and he assigns the members of the conference to the pastoral charges within its limits. Each annual conference is divided into two or more districts, to each of which districts a presiding elder is also assigned by the bishop. The presiding elders may be assigned for four years successively to a district, and the ministers for three successive years only to the same pastoral charge.

At the annual conference the character of the ministers is inquired into, reports are received from them of the moneys collected in their charges for the various benevolences of the church. They also elect to membership preachers who have been recommended by the quarterly conferences, and they determine their own relations to the conference, as effective, supernumerary, or superannuated.

In each pastoral charge there is a *Quarterly Conference*, of which the presiding elder is president, and to which the preacher in charge and all other resident preachers belong. The quarterly conferences superintend and supervise the temporal and spiritual interests of the local church. They are composed, in addition to preachers and exhorters, of the *trustees* of the church property, when members of the church; of the *stewards*, who are elected by the conference on the nomination of the preacher; of the *leaders* of classes, who are appointed by the preacher in charge, and of the *Sunday-school superintendent*, who is nominated by the Sunday-school board and elected by the quarterly conference. In each local charge there is also a leaders' and stewards' meeting, which advises concerning the administration of the discipline and the funds of the church.

Lay Representation.—The question of lay representation in the general conference, which was discussed from an early period in the history of the church, was settled affirmatively in 1871 by a vote of the entire church, and at the Twenty-first General Conference, held in 1872, in Brooklyn, 129 laymen were admitted as delegates and members of the body. Once in four years each quarterly conference elects a delegate to the lay electoral conference, which meets at the time of the annual conference and elects by a majority vote two laymen as delegates to the general conference. These delegates have all the rights and privileges of the clerical members. A separate vote by orders may be demanded by one-third of either order, and in such cases the concurrent vote of both orders is necessary to complete an action.

Episcopacy.—There have been 41 persons elected as bishops, only one of whom, the Rev. Wilbur Fisk, D. D., LL. D., elected in 1836, declined the office, in order to remain connected with the educational work of the church, he being at the time president of Wesleyan University. The bishops have generally been selected on the basis of purity of personal character and executive ability in administration. They have not all of them been distinguished as preachers, but have maintained characters above reproach. Since the election of the first eight, but four of them have been selected from the ranks of the itinerants: the others having been elected while occupying some official position. With a few exceptions they have not ranked in the pulpit with the great orators of the church; but they have everywhere proved themselves efficient in administration, and complaints against any of them for malfeasance in the delicate task of assigning the ministerial appointments have been rarely made. Their episcopal residences are fixed by the general conference. Their salaries and travelling expenses are provided for by a special collection made in all the churches annually. They divide among themselves, in their annual meetings, the conferences over which they will preside; and the jurisdiction of a bishop in an annual conference begins with his assignment to it as president, and continues until some other bishop is assigned to it as his successor. They decide all questions of law when presiding in annual conferences, but such decisions may be appealed from and are subject to review at the next general conference. Three of them have been elected as missionary bishops, by which designation their episcopal functions are limited to the territory occupied by the mission.

The presiding elders, of whom there are 487, are appointed by the bishops. They form a council or cabinet who advise the bishop with reference to the appointments of preachers, their work of supervision bringing them constantly in contact with the churches and their necessities. Their salaries are paid by the local churches under the direction of a meeting of the stewards of the district, who determine the amount they are to receive, and the proportion of that amount to be raised by each of the charges in the district.

The itinerant ministers, of whom there are 11,676 reported in 1885, are members of the Annual Conferences. They become such by their election by the conferences, and are divided into 9122 effective, 1041 supernumerary, and 1513 superannuated members. These receive their assignments to work from the bishops, and are responsible to the conference for their administration. They are supported by the churches which they are appointed to serve; and in each charge a collection is annually taken for the relief of the superannuated preachers and the widows and orphans of preachers who have died in the work. The itinerancy consists in the removal of each minister from a charge at the end of a specified time, and his appointment to another field of labor, while a successor takes his place in the church thus vacated. It is claimed that this leaves no vacant pulpits and no unemployed preachers.

The published statistics in 1885 exhibited the fact that in the various conferences in America and elsewhere the travelling preachers received as support $7,792,407. That they preached in 19,384 church buildings, valued at $74,833,142, and lived in 6918 parsonages, valued at $10,600,612.

The Laity.—The lay members, of whom there are 1,855,844, are divided into: probationers, of whom there are 196,028; full members, 1,659,816; of whom 12,397 are local preachers. Local preachers may be ordained, but unless admitted into annual conferences they retain their position as laymen. Women are not eligible for ordination or for license to preach, but may hold other official relations to the church. The local preachers have been largely influential in the work of the church, and many of them have been conspicuous for ability in the pulpit. They have an organized national association, which meets annually.

Publishing Department.—A distinguishing feature of Methodism has been its effort to furnish a literature to its own people. Mr. Wesley availed himself of the press to a remarkable extent. The early preachers were pledged to circulate his tracts and books which were more numerous and wider in variety than those of any other religious teacher. Five years after the organization of the Methodist Episcopal Church a book steward was elected, and as a result of his labors a "Book Concern" was established. This is the property of the General Conference, subject entirely to its control. A General Book Committee, consisting of one member from each of 12 groups of conferences, and three members from New York and vicinity, and three from Cincinnati and vicinity, have general supervision of the publishing interests of the church. They own property in New York and Cincinnati and other cities, and transact business on a capital of $1,748,912. They publish a catalogue of 2730 books besides 1331 tracts, and other Sunday-school requisites. In 1885 they issued 227,699,130 pages of books and tracts, a daily average for each working day of 730,282 pages, and the sales of the publishing houses from 1880 to 1884 were $6,455,487.28. Nineteen periodicals are published by authority of the General Conference, and there are 53 other periodicals published by the church. The agents of the Book Concern, and the editors of the publications authorized by the General Conference, are elected quadrennially by the General Conference, their salaries are estimated by the book committee.

Education.—The history of the educational movement of the church covers the three periods: of initial effort and severe trial (from 1784 to 1820); of successful and gradual growth (from 1820 to 1866); and the period of enlarging success and stability (from 1866 to the present time).

Simultaneously with the organization of the church and their own election to office, Bishops Asbury and Coke projected the Cokesbury College. It was located at Abington, in Maryland, and after 8 years of growing prosperity the buildings were burned to the ground, and the institution was removed to the city of Baltimore, where in 1799 the buildings were again burned, and that initial movement was discontinued. In the General Conference of 1820 the subject of education received special attention, and the foundation of academies and classical seminaries began. In 1847 the first separate theological school of the church was opened at Concord, in New Hampshire, under the title of the General Biblical Institute. In 1856 the second theological school was founded at Evanston, in Illinois. At the end of another decade, when the church celebrated its first centenary, enlarged plans of church action were made. There were at that time 102 literary institutions in the ownership and under the patronage of the church. The centenary offerings for all objects reached $9,000,000, and about one-third of this amount was consecrated to the cause of Christian education. There are now 10 theological schools, 45 colleges and universities, 69 classical seminaries and female colleges, and 19 foreign mission schools with 28,591 students, and buildings and grounds estimated to be worth $7,584,640; and endowments to the amount of $7,031,176.

Benevolences of the Church.—These, by the action of the General Conference of 1872, are administered by boards, constituted of equal numbers of ministers and laymen, to which are added the bishops of the church.

The *Missions* of the church were organized in 1819, and include *Foreign Missions* in Africa, South America, Germany and Switzerland, Scandinavia, India, Bulgaria and Turkey, Italy, Mexico, Japan, and Corea; *Missions in the United States* administered as foreign missions; and *Domestic Missions* among the Welch, Swedes, Norwegians and Germans, French, Chinese, American Indians, Bohemians, and English speaking peoples. These are maintained by annual contributions from all the churches, which in 1865 reached $654,653, with an additional expenditure by the Woman's Foreign Missionary Society of $133,367. There are employed in the missions of the church more than 3000 American missionaries, besides 800 native preachers in foreign lands. The total value of churches and parsonages in these fields represents about $2,000,000. The Woman's Foreign Missionary Society, a most valuable and efficient organization, does its special work among the women in foreign lands, issues its special periodicals, and constantly grows in the confidence and affection of the church. The missionary organization has head-quarters in New York.

The board of *Church Extension* has its head-quarters in Philadelphia. The organization was initiated at the General Conference of 1864, and the work is done through "loan funds" contributed by individuals, the interest of which is loaned to needy churches, and by gifts which are collected in the churches, that are donated. The work done by this board is of increasing value in each year; the loan fund having reached a total of $1,000,000, and the donations in 1885 having been $137,361. The board of church extension accepts contributions, subject to an annuity payable to the order of persons making such donations.

The *Tract Society*, organized in 1852, with head-quarters in New York, received in 1856, $14,972, for its work. It publishes tracts in German, French, Spanish, Italian, Swedish, and Danish, as well as in English. It has aided every foreign field, and has published over 750,000,000 pages of tracts.

The *Sunday-School Union*, organized in 1840, has its head-quarters in New York. The reports to the General Conference in 1884 showed 21,453 Sunday-schools; 229,565 officers and teachers; and 1,796,034 scholars. In 1885 the collections for the work of the Union amounted to $15,753.

The *Freedmen's Aid Society*, which was organized soon after the close of the civil war, in 1866, has its head-quarters at Cincinnati, Ohio. Its receipts for the year 1885 were $174,752. It maintains in the Southern States 22 universities and seminaries for colored people, and 18 institutions for white persons, with a total number of students of 6219.

In connection with this Methodist Episcopal Church, in order to rightly appreciate the force and influence of Methodism, it must be noted that the Methodist Episcopal Church South, with other forms of Episcopal

Methodism in the United States, bring the numbers up to 3,762,987 members. Of non-Episcopal Methodists in the United States there are 195,169. So that the Wesleyan family of churches gives the following total of ministers and lay members:

Methodists.	Itinerant ministers.	Local preachers.	Lay Members.
United States	25,626	34,638	3,958,156
Canada	1,628	1,959	168,803
Great Britain and missions	3,927	36,675	864,717
In affiliating conferences	934	4,607	133,316
Totals	32,115	77,879	5,124,992

(O. H. T.)

MEXICAN WAR. *Causes.*—The United States made a treaty with Spain in 1819 at the time Florida was ceded. The South-western boundary was then established, the division line between what was known as the "Louisiana purchase" and Mexico being the Sabine River. Mexico at that time claimed Texas as one of her provinces. The U. S. minister was authorized by the state department in 1827 to make a tender of $1,000,000 to the Mexican government for the territory of Texas. For reasons, by him deemed sufficient, he did not make this offer. In 1829 the offer was actually made; the amount being increased to $4,000,000 or even more. Texas was not to include any part of the Valley of the Rio Grande, nor any land east of the Nueces; and New Mexico was to remain as a province of Mexico.

During the year 1830 the famous Gen. Sam Houston (for whom see ENCYCLOPÆDIA BRITANNICA), at the head of a company of enterprising men and a band of Cherokee Indians, went from the United States into Texas. Their object was to foster revolution, seize the reins of government, emancipate Texas from Mexico, and annex it to the United States. These restless spirits were working in the interests of a Southern policy, hoping so to increase slave territory as to keep a balance of power against the free States, which being formed from the Territories, were increasing in number. The Texas insurgents were successful, and a convention for forming an independent State constitution was called. This body came together April 1, 1833, but it was not until March 2, 1836, that Texas proclaimed her independence. Mexico not acknowledging it declared war. In that war the Texans under Houston gained on April 21, at San Jacinto, a decisive victory over Santa Anna, the Mexican general, and the latter, being taken prisoner, signed a treaty with Houston, which secured the prompt retirement of the Mexican army and the nominal independence of Texas. On Oct. 22 Houston became President of Texas, and in the following March he secured from the United States the acknowledgment of the independence of the Republic of Texas. Some other nations following this lead soon after joined in the acknowledgment. Mexico, in fact, had not assented to the treaty of Santa Anna, and certainly had not released her claim upon the land lying between the Nueces and the Rio Grande when, in August, 1837, the Texas envoy went to Washington and proposed the annexation of Texas to the United States. These overtures were then declined. The grounds of denial stated were a non-interference in foreign quarrels and to avoid espousing a doubtful cause, as the United States hitherto had uniformly shunned such complications.

There being, however, a strong Southern party in favor of annexation, a similar tender was several times made, but with like result till after John C. Calhoun became secretary of state during the administration of John Tyler. Then the measure was hastily passed by a joint resolution of the two Houses of Congress (March 2, 1845). President Polk, who succeeded Tyler two days later, ordered Gen. Taylor in the ensuing July to proceed to Corpus Christi on the Texas border with 1500 men.

The Campaign in Texas.—Taylor was first instructed to guard the soil of the new State, and he to this end naturally located his forces near the eastern bank of the Nueces. Taylor, however, would proceed no farther without definite and explicit instructions. Finally, in March, 1846, he received from the President positive orders to cross "the disputed territory" to the Rio Grande. Gen. Ampudia with a Mexican force was at the time on the other bank at Matamoras, and instantly demanded that the Americans should return to the Nueces. If they did not Mexico would interpret this conduct as a declaration of war, or its equivalent, on the part of the United States.

Ampudia was replaced shortly after by another general, Arista, under whom the Mexicans boldly crossed the Rio Grande with about 6000 men. After an inconsiderable success, capturing a reconnoitring force of Taylor's, they attacked his small army of some 2300 men at Palo Alto. In this battle Taylor gained an important victory and forced the Mexicans to retire to Resaca de la Palma. Here Taylor, pursuing his advantage, assailed them the following day. He gained a second victory, routed the Mexicans, and drove their whole force beyond the Rio Grande. In these engagements the Mexican loss was about 1000 men, 8 guns, and considerable other material of war, so that the entire disputed territory was thus secured to the United States by force of arms.

The President, claiming the disputed ground, was enabled by the Mexican's attack to declare in a special message to Congress that the U. S. territory had been invaded and the blood of the citizens of the United States shed upon their own soil. Under the excitement of successful war Congress passed, May 13, an act which put into the field 50,000 volunteers, and for the thorough prosecution of the war appropriated $10,000,000 from the treasury.

Kearny's Expedition.—Shortly after the declaration of war Gen. Kearny, with about 3000 men, was despatched from Fort Leavenworth, Kansas. His instructions were to conquer New Mexico, Chihuahua, and California, an immense tract of country but sparsely populated. His army was made up of three squadrons of regular cavalry, two regiments of Missouri cavalry volunteers, one battalion of Mormons, and a few pieces of artillery. His train of ammunition and provisions was necessarily large, so that the entire column, guarded by his showy cavalry, made a formidable appearance. Kearny made a bold push for Santa Fé, and though the Mexican forces in that quarter were sufficient in number, and had the best defensive positions, yet they were terrified at his approach and fled, so that Kearny entered Santa Fé, the capital of New Mexico, without a battle. Now this enterprising officer left there his main force for preserving New Mexico, and, if possible, capturing Chihuahua, and took with himself the small detachment of 100 dragoons and two mountain howitzers, and set out for the Pacific slope at a distance of at least 1500 miles. Col. J. C. Fremont (*q. v.*), then known as the "Path-finder," with a band of venturesome spirits and some Indians, had set out the year before, had crossed the Rocky Mountains, and arrived in California.

Before the arrival of Kearny Fremont had displaced the Mexican rulers and declared California independent. Still the Territory was by no means in a settled condition, and the Mexicans had a hostile force in the field. At San Pascual, not far from San Diego, he encountered a superior force and a severe combat ensued, the issue of which was for a time doubtful. Finally Kearny, though severely wounded, succeeded in defeating his adversaries, and then proceeding to San Diego, formed junction with a naval force under Com. Stockton, Dec. 11, 1846. After a little rest, Jan. 8, 1847, another battle took place at Los Angeles, in which the U. S. forces were successful. After this battle Kearny continued his march northward till he formed junction with Col. Fremont. The California province was immediately annexed as a Territory to the United States and Kearny became the first governor.

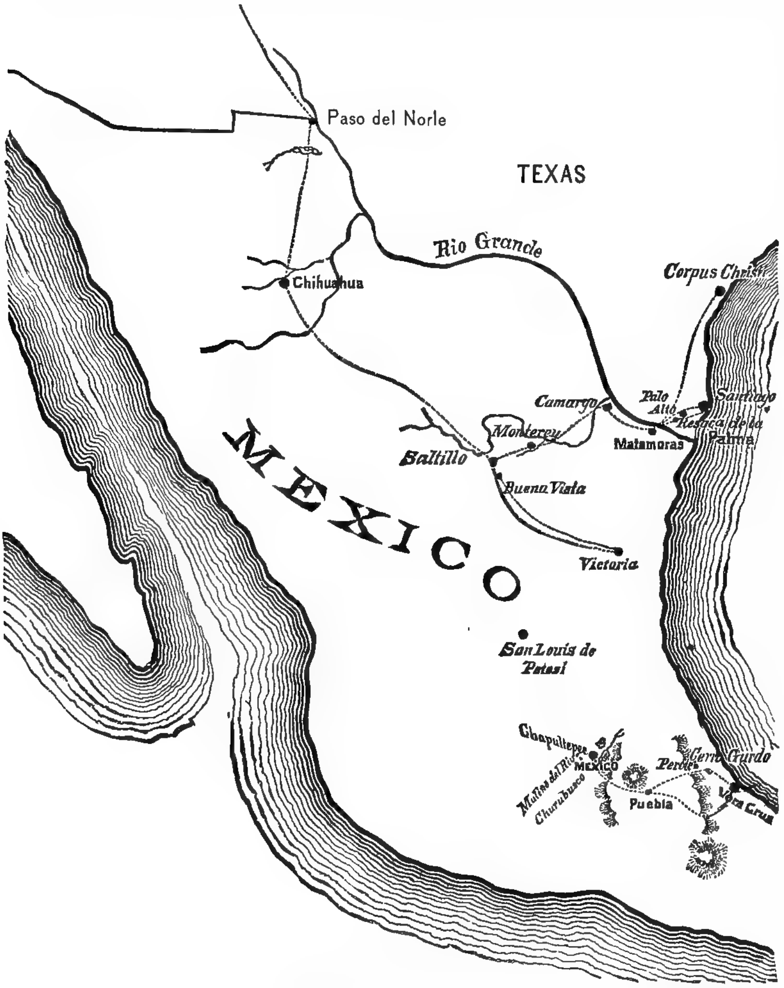
To return to the main force which Kearny left at Santa Fé, Col. A. W. Doniphan (*q. v.*), the senior, was in command. After making a treaty of peace with the Navajos, then the most numerous Indian tribe in New Mexico, and leaving Col. Sterling Price in charge of the garrison at Santa Fé, with one regiment about 800 strong and a battery of 4 guns, manned by 100 artillerymen, he undertook the long march to the capital city of Chihuahua. He was soon reinforced by a body of American pioneers, who always have been remarkable for the enterprise with which they have pushed forward their trade and their settlements. These frontiersmen had a train of more than 300 wagons; but instead of being an encumbrance they organized themselves into companies and materially aided Col. Doniphan in scouting and guard duty. After passing immense stretches of desert country, making long marches often without water, they reached what is called the North Pass; but the animals were so much emaciated that the most of their material had to be abandoned, and there was danger of the entire body perishing from thirst, when, as if by a special providence, a heavy rain came to their relief. Another danger, an immense prairie fire, doubtless set in motion by hostile hands, came near consuming their train; but by the most energetic efforts, in making trenches and setting "back-fires," they succeeded in warding off the danger and preventing a considerable loss. Doniphan, on Feb. 28, 1847, reached the Rio Sacramento, where he found the Mexicans in some force guarding regular works. Turning the redoubts he forced the Mexicans to attack him, and succeeded, after a hard fight, in gaining a victory. The Mexicans left in his hands some 300 killed and wounded and 10 pieces of cannon. The next day, Feb. 29, Doniphan's victorious troops entered Chihuahua, the capital city of the province, numbering about 26,000 inhabitants, and here this small force remained for nearly two months. Doniphan did as American leaders are wont to do. He reorganized the government of the city and province and improved every way the police regulations, while the enterprising traders who accompanied him now reaped their harvest.

Taylor in Mexico.—After the battle of Resaca de la Palma, Gen. Taylor passed the Rio Grande and occupied the city of Matamoras. Thus even on the President's theory Mexican territory proper was invaded. The army rested here until August, when it was reinforced. Gen. Taylor, after garrisoning Matamoras with a small detachment, moved his army forward to Camargo. One brigade of infantry, the artillery, and cavalry ascended the river by marching up its right bank. This column was under Lieut.-Col. Garland of the Fourth infantry. The remainder of the command was carried up the river by boats. This movement was completed by Sept. 1, 1846, and on the 5th an advance in four divisions from Camargo was undertaken. The head of column halted at Marin, 24 miles short of Monterey, and remained there till the four divisions were massed; then the little army proceeded together to Monterey. On the 19th Taylor went into camp at Walnut Springs, a short distance from the city. Monterey and its neighboring defences were held by 10,000 men and a good supply of cannon under the Mexican Gen. Ampudia. Taylor had at this time reorganized his force, aggregating about 6500 men, into three divisions under Gens. Butler, Twiggs, and Worth. First an engineer reconnoissance was made, from which it was ascertained that he could gain the Saltillo road, and then cut the enemy's communication with the interior. Worth's division, taking a westerly course, undertook to reach this road, starting on its march the afternoon of Sept. 20. Meanwhile Butler's and Twiggs' divisions were so drawn up as to threaten the works on the north and east of the city, being instructed to favor and promptly support Worth's movement, which was deemed the main attack. Gen. Taylor, the night of the 20th, located his batteries, and next morning opened a brisk fire. These simultaneous efforts so far succeeded that on the 21st the troops were in possession of Monterey and all its defences excepting the "Black Fort" just north of the town, the Plaza in its centre, and some works east of the city. The army rested during the 22d. The night following the Mexican general evacuated the works east of the town. Hostilities were resumed the next day, and on Sept. 24 Ampudia surrendered. From the nature of his instructions Gen. Taylor then put his command into camp, and remained in this vicinity for nearly two months. Resuming operations, Taylor entered Saltillo Nov. 16, where for a time Worth was left in command; Taylor returning to Monterey. On Dec. 13 he detached Gen. Twiggs, with one division, to Victoria; Gen. Quitman with another followed the next day, and Gen. Patterson with a third a few days after. On Dec. 29 Gen. Quitman succeeded in entering Victoria without resistance, and on Jan. 4, 1847, Taylor, with the other two divisions, joined him there. At this time Gen. Worth, at Saltillo, fearing from reports that he would be overwhelmed by superior numbers, called eagerly for help. Gen. Wool coming from the north, and Butler from Monterey, hastened to his assistance. When Taylor found that Worth's alarm was without adequate cause, he relieved him by Butler, and Wool passed on to hold the pass of Buena Vista. It was at this juncture that the orders came which were to take from Taylor the best part of his command. As soon as this detachment to Scott was accomplished, Taylor, feeling himself too weak to control so much country, fell back to Monterey, and for the time abstained from any aggressive movement.

Buena Vista.—While Taylor was still at Victoria, Gen. Santa Anna, then occupying San Luis de Potosi, had intercepted some despatches which had been sent from Scott to Taylor. Through them he became aware of the weakness of Taylor's army, and made his plans to destroy it. Santa Anna wisely planned, first, to make a forced march, crush Taylor's army, and then turn with his victorious troops to meet and withstand Scott, whom he already expected to march on the capital city by another route. Taylor being absent on a reconnoissance, Wool was temporarily commanding Taylor's army. He, learning of Santa Anna's advance, and recognizing the great natural strength of Buena Vista, posted all the forces that he could gather there in what has been called the "Thermopylæ of Mexico." Santa Anna soon approached with about 20,000 men, bringing them against Taylor, who had now returned to command less than 5000 soldiers. The battle of Buena Vista resulted, being fought Feb. 22 and 23, 1847. In this the Mexicans suffered a complete repulse, being driven back with heavy loss. Taylor had 268 killed and 456 wounded, while the enemy's killed and wounded were over 2000 men.

The regiment of cavalry under Col. Doniphan remained at Chihuahua till May, 1847. Then, as the small force sent from Taylor did not succeed in crossing the mountains to join him, orders reached him to cross over to the main army of occupation, then at Saltillo. This tedious march of 450 miles through the enemy's country he accomplished without serious loss. He had hardly reached the main army when the term of enlistment of his volunteers expired, so that without further service they marched to Matamoras unmolested, and soon embarked *via* New Orleans to Missouri, where they had been enlisted. Here they were discharged.

Scott's Campaign.—The Mexican war was mainly of a political nature, undertaken by a Democratic administration, so that Taylor's marked successes created considerable alarm lest he, a popular Whig, should lead the party in opposition to a victory. With a view of hindering such a political event, Gen. Scott, the only available officer, was ordered to go to Mexico and carry out plans of campaign which, previously submitted by him, had been once rejected. A military success by Scott, also a Whig, it was believed by political leaders would serve to lessen Taylor's popularity, and defeat any political aspirations which he might have. Late in December, 1846, Gen. Scott arrived in Santiago, and went thence to Camargo, where he had ordered Taylor to meet him. The meeting failed, because the orders did not reach Taylor in time. Scott, however, then went on without consultation to withdraw from Taylor the greater part of his troops.



Sketch-Map of the Mexican War.

These formed a division under Worth, who made forced marches from Monterey to Santiago, where, in impatience, he was forced to wait several weeks for transports. Scott finally gathered his forces in the harbor of Anton Lizardo about 16 miles S. of Vera Cruz. When he had accumulated sufficient supplies and what he deemed an adequate force, March 7, 1847, he proceeded northwards and landed his army some 3 miles S. of Vera Cruz. Here he formed an intrenched camp with a force of about 12,000 men just out of range of the enemy's guns. A regular siege was kept up until March 27, when the Mexican Gen. Morales made overtures. On the 29th he surrendered to Scott Vera Cruz and the fortification of San Juan de Ulloa, gave up 5000 prisoners, 400 pieces of artillery, with plenty of ammunition and small arms. Scott lost but 64 men killed and wounded. Scott had been promised by the administration more men. He waited for them till April 8, then not receiving them, and fearing, from the nature of the climate, sickness, he set out with his small army of 12,000 men in three divisions under Twiggs, Patterson, and Worth. His objective point was the City of Mexico. Twiggs, followed by Patterson, marched on Jalapa. On April 13, Worth left Vera Cruz and took the same route. Twiggs' advance encountered the enemy about 50 miles W. of Vera Cruz at Cerro Gordo, and here he waited for Patterson. Scott arrived the 14th, and took command of the field. Santa Anna, with his repulsed army, was there before him. Scott, promptly masking his front, turned his enemy's position and quickly drove the Mexicans from their works, making a capture of 3000 prisoners and much ordnance and stores. The march on Jalapa was then resumed. Worth having come up speedily, captured Perote. Now Scott, much to his discomfort, was obliged to send back 4000 of his volunteers to Vera Cruz, as their term of service for one year was about to expire. From various causes his force then hardly exceeded 5000 men. Early in May he sent Worth's division forward to Puebla, Scott himself coming up late in that month. He remained there till August, when his expected reinforcements at last arrived. He promptly reorganized his army, putting four divisions under Twiggs, Worth, Pillow, and Quitman, and a cavalry division under Harney. On August 7 the march was again resumed, Twiggs' division leading and taking the route over the Rio Frio Mountains.

Scott's reconnoissances brought him the intelligence that the road to Mexico between Lakes Texcoco and Chalco was not practicable, as it was guarded by strong fortifications near El Peñon. Scott first concentrated his forces at Ayutla on the eastern extremity of Lake Chalco. While there he discovered a practicable route which led south of Lake Chalco. By this he could approach the City of Mexico from the south and south-west. By the 18th of August his troops were some 11 miles due south of the City of Mexico, at St. Augustin-Tlalpam. Between this place and the City of Mexico were the hamlet of San Antonio and the village of Cherubusco. Slightly to the north of west, about 3 miles from Tlalpam, was Contreras. This place Gen. Scott decided to capture first and thence proceed to the City of Mexico; for he found it impracticable to go directly *via* San Antonio and Cherubusco. Garland's brigade was advanced to within easy range of San Antonio and sheltered as much as possible from the enemy's fire. On the 19th the other troops were pressed towards Contreras, and the next day this place was captured, many prisoners and stores falling into Scott's hands. Now, part of Worth's command was moved eastward toward Cherubusco and Garland's brigade advanced towards the same place. This caused San Antonio to be evacuated even before Garland reached it. Next Cherubusco, after hard fighting, was turned and captured. So also were, successively, all the defences seized up to the very City of Mexico itself. Scott's scientific engineers, during this remarkable advance, rendered excellent service; their accurate reconnoissances greatly aiding Scott to gain his victories.

The general, for political and diplomatic reasons, for some time abstained from entering the capital, having posted his army to the south of it. A truce was then entered into between him and Santa Anna, but for some unknown reason it was several times broken by the Mexicans. As early as practicable, negotiations were begun with the Mexican civil functionaries. On September 2, the U. S. commissioner stated his ultimatum, namely, *Texas to be given up*, *California and New Mexico to be ceded to the United States.* These terms were rejected and the Mexicans commenced preparations for renewing the struggle in plain violation of the truce.

Scott then declared the armistice at an end. Worth's division proceeded against Molino del Rey, captured it the 10th of September, and the Mexican garrison retired to Chapultepec. The castle of Chapultepec, the last stronghold, was bombarded Sept. 12, and Pillow, with 500 men in two columns, made a bloody attack, which proved successful. Meanwhile Worth was successful in his assault upon and capture of San Cosme. On the night of September 13 Gen. Santa Anna withdrew from the city and the civil authorities asked for an armistice, but Scott refused to bind himself by any conditions. During these operations Quitman had advanced to and held the Belen approach, so that on Sept. 14 the army passed into and took complete possession of the capital city.

The Results.—After Santa Anna's escape it was difficult for Gen. Scott and Commissioner Trist to find any functionaries who would bear the responsibility of representing the Mexican government. Finally, on Feb. 2, 1848, a commission having been authoritatively organized, the treaty of Guadalupe-Hidalgo was completed and signed. It contained the first proposals making a cession of all the territory to the Rio Grande; also of California and New Mexico (which included Arizona) to the United States, but requiring the payment of $15,000,000 on the part of the U. S. government and the assumption of $3,000,000 more of Mexican debts. Gen. Scott, during the occupation, distributed his forces in such way as to hold firmly the authority, and gave, under martial law, the most complete system of regulation and order to the capital and good laws to the entire State. On July 4, 1848 Pres. Polk proclaimed peace between the United States and Mexico.

The whole number of American troops engaged in this war was 101,282, of whom 27,506 belonged to the regular army. The losses were 1049 killed and 3420 wounded.

Some military criticism has been offered concerning the invasion and the entire campaign. It is sufficient to say that the best test of a bridge is the safe crossing. The test of military plans is the successful and fruitful execution of them. Had Taylor's army been reinforced and not depleted he would doubtless have come upon the plains of Mexico from the north and found a clearer way than Scott's, and he would have been able to turn both the mountain passes through which Scott was obliged to thread his way. But Santa Anna, with his larger numbers, stood a fair chance against Taylor in the open plain. Scott's army being so much smaller than that of his adversary, it was always better that he should be in the mountains. The instant he secured a mountain pass he had a shelter and virtually a new base. His reconnoissances showed him that he could seize the passes, and then after seizure they could be turned to double advantage.

The U. S. forces were under disciplined officers from the highest to the lowest, and they had the best of regular troops forming a large part of the organization. Again, they were from first to last well equipped, well furnished with artillery and engineers, and most ably commanded.

The individual Mexican was brave enough, but the armies seemed to have no general, except Santa Anna, of ability or much experience. They did not have good artillery officers nor competent engineers. Their hosts were undisciplined, hastily thrown together, and badly organized. How different the Mexican regular army is to-day! It is larger than that of the United States and is supplied with educated officers from its excellent military school. Mexico, obtaining such generous terms, was rather benefited than injured by the war, and has indeed learned good and wholesome lessons from her adversaries. (O. O. H.)

See Vol. XVI. pp. 214 and 897 Am. ed. (p. 206 Edin. ed.)

MEXICO. A significant fact in relation to this interesting country is the very great excess of population in the Southern States of the confederation as compared with those of the North. The Northern States, for the most part, have larger areas and a healthful climate, but they have also a limited rainfall. Their mineral and pastoral resources are great, but so are those of the other districts, which have in addition a fertile soil and a copious rain supply. Recent writers of high standing have warned students of Mexican affairs not to put much faith in the published official statistics of a country which never yet had a genuine census nor a public survey of any considerable part of its surface. The official estimates are declared to be in general nothing but guess-work. Mr. David A. Wells, who visited the country in 1886, declares that there are still extensive regions in it into which no white man has ever dared to enter; and that there are native tribes whose very names are unknown to Spanish-speaking Mexicans. Mr. Wells, after a general discussion of the resources and prospects of Mexico, pronounces it "one of the very poorest and most wretched of all countries." On the other hand, an American citizen, resident for some years at Tuxpam, in the *tierra caliente*, says that the undeveloped forest region to the westward of that post is a veritable poor man's paradise, abounding in all things needful for the health and comfort of man, with singularly few disadvantages.

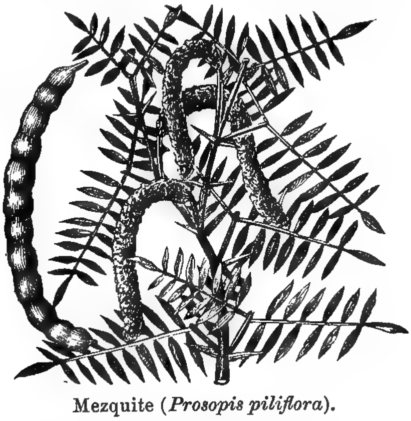
At any rate, Mexico has recently made, and is still making, commendable progress in many ways. Brigandage, which was widely prevalent, is now much repressed, and, indeed, scarcely exists, except in remote regions. Peonage is gradually disappearing. The revenues are apparently well administered, and the public receipts exceed the expenditures. The army is better equipped and better officered than ever before. A laudable ambition exists to see the foreign debt honorably adjusted. The work of exploring the less known districts, and of studying their archæological remains, is receiving much attention. Immigration, especially that of laboring people of the Latin races, is greatly encouraged. Railroads are still lengthening their lines.

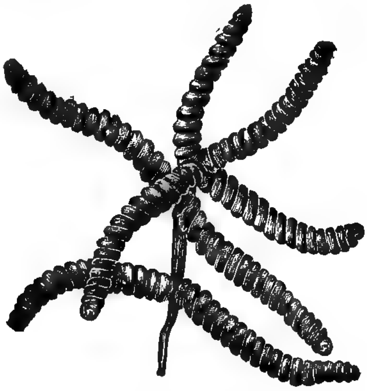
Recent History.—The presidential term of Manuel Gonzalez came to an end Dec. 1, 1884. He was succeeded by Porfirio Diaz, who had already occupied that difficult position, and who had given proof of his possessing excellent talents for public affairs. A proposed reciprocity treaty with the United States was finally rejected by the Senate, at Washington, in 1884. A long and complicated diplomatic correspondence was commenced in 1882 with representatives of the British government, who pressed the claims of the English bondholders against Mexico. The old debt had for a long time been commonly looked upon as a dead loss; and there is reason to believe that no small part of it had been contracted irregularly, or by revolutionists. By the arrangement finally made (1884) with the English bondholders, new bonds were issued, covering £17,200.000 of indebtedness, or less than one-fifth of all that the bondholders claimed. Diplomatic relations with England, which had been suspended for some years, were resumed in 1883.

MEYER, Heinrich August Wilhelm (1800–1873), a German theologian and commentator, was born, Jan. 10, 1800, at Gotha, where his father was court-shoemaker. He studied theology at the University of Jena, and in 1821 became a teacher. In 1822 he was ordained as pastor at Osthausen, and in 1831 he took pastoral charge of Harste. In 1841 he obtained a higher position at Neustadt, but in 1848 he went to Hanover to devote himself more completely to his exegetical work, in which he had been long employed. In 1861, his fame being established by his works, he was made a member of the Upper Consistory, but in 1865 he retired on a pension. He died at Hanover, June 21, 1873. His fame rests upon his *Commentary on the Greek New Testament*, which began to appear in 1829. As parts of the work appeared their excellence was so manifest that new editions were called for, and the author devoted much time to revision of what he had already published. Before he had finished his labors on the Pauline Epistles he was obliged to seek help from others. Lünemann and Huther completed the Epistles, and Düsterdieck added the commentary on the Apocalypse. The various editions of his work show his constant growth in knowledge and spirituality. It is the most learned and accurate philological commentary on the New Testament. Since the author's death the *Commentary* has been revised by several prominent scholars. The English translation, edited by Dr. Wm. P. Dickson, was made from Meyer's last edition. It is comprised in 20 volumes (1873–82).

MEYER, Johann Georg, a German painter, was born at Bremen, Oct. 28, 1813. He studied art at Düsseldorf and at first devoted himself to Biblical subjects. Afterwards he turned his attention to *genre*, acquiring great popularity by his pictures of children, which have given him the surname of "Kinder-Meyer." Several of his paintings are owned in the United States. Among the most noted are The Little Housewife, The New Sister, What has Mother brought? Little Brother Asleep, The First Prayer. In 1852 Meyer took up his residence at Berlin.

MEZQUITE, often written Mesquit, is the *Prosopis piliflora* of De Candolle, *Prosopis glandulosa* and *Algarobia glandulosa* of other authors. It is a leguminose tree, allied to mimosa. It is a small tree, sometimes reaching over 40 feet in height. It has narrow pinnate leaves, with about 10 pairs of pinnæ, and with a pair of somewhat setaceous stipular spines at the base of the common petiole. The pods are borne on short sub-racemose clusters, somewhat pointed, buff color, when ripe, and somewhat resembling the Honey Locust, which name it also occasionally bears. It is found from the Trinity River, in Texas, across the desert to the San Bernardino Mountains, and extends northward to Southern Colorado and Southern Utah. It is frequently the only tree found in these desert regions, and seems to thrive no matter how dry may be the location, though often reduced to a mere bush. The roots develop to an enormous extent and thus enable the tree to endure drouth. Roots weighing several hundred pounds have been dug where the plant itself was but a few feet high. These roots are known as underground forests. The wood is heavy and very hard, but not strong, and is almost indestructible in the ground, and hence is exclusively used for fencing, for the foundations of adobe houses, felloes of heavy wheels, and some articles of household use. It is the only fuel and produces valuable charcoal. The trunk is seldom over a foot in diameter and is too knotty and crooked to be worthy of the name of lumber. The grain of the wood is fine and it takes an excellent polish. It varies from purple in the centre to red and yellow towards the circumference. The hard wood is used with great success as paving blocks for streets. The heart-wood and root contain about 6 to 7 per cent. of tannin. The young plants make the best possible hedges for the section of country in which it is found. The mistletoe, *Phoradendron flavescens*, grows with great luxuriance on these trees and often gives them a very peculiar appearance. Its great value is for its thick, fleshy, and sweet pods, which are produced in the greatest abundance in the dryest seasons. It is the chief food of the Indians of that region and highly appreciated by the white settlers. The pods commence to ripen in June, when they have a taste which is described as a "tartish-sweet." The Indians bruise the pods, mix with water, and let the mixture stand a few hours, and then eat it as mush. For winter use they thoroughly dry the pods, store in large baskets, and cover to keep out the rain. They are usually badly infested with the larvæ of an insect allied to the pea-weevil, a species of Bruchus. (See Vol. I. p. 140.) Preparing the pods for cakes they are beaten very fine in order to destroy these larvæ, when the mass is stirred with water and the cakes sun-dried. The pods boiled and fermented make a slightly stimulating drink, which is a favorite Indian beverage. Vinegar may be produced from it; 25 to 30 per cent. of sugar has been found in the bean. In former times there would be much distress among the Indians when there was a failure in the crop of mezquite beans. Horses and cattle are so fond of the beans that it is said they will leave herbage for them. The gum is almost identical with gum-Arabic in character and is used for gum-drops, jujube paste, etc. Dr. Havard says the quantity secreted by each tree is not large enough to make it an important article of commerce. A government document published in 1872 states that the quantity varies with the season and the abundance of the insect which by puncturing the bark induces the formation of gums, and that during 1871 there was collected in Bexar county alone 12,000 lbs. The Indians mix the gum with mud and then rub it through the hair. It cleans the head of parasite creatures and renders the hair bright and glossy. The Indian women weave the inner bark into Indian shirts and twine it into cordage. An allied species, *Prosopis pubescens* of


Mezquite (*Prosopis piliflora*).


Screw-pod Mezquite.

Bentham, the Tornillo of the Mexicans, is sometimes known as the screw-pod mezquite. The twisted pods are used as the other, but its smaller size lends it less importance. Like the carob tree of Europe these are known as Algaroba, which seems a generic term for all this class of pod-bearing trees. A number of allied species of *Prosopis* are known in South America as Algarobas. (T. M.)

MIAMI, a tribe of Algonkin Indians, who once occupied a large section of Western and Northern Ohio, extending into Michigan, and were noted for their warlike spirit and their persistent hostility to the Americans. When first found by the French, in 1658, near Green Bay, they numbered about 8000, and lived in mat-houses surrounded by palisades. A Miami settlement on St. Joseph River was attacked by the Iroquois in 1683. The Miamis took part in the French and Indian war, vacillating somewhat, though generally aiding the English. In the Revolution they sided with the English. In 1790 they broke into open hostilities against the whites, and a long-continued war followed. They defeated Col. Hardin in that year, and in 1791 utterly routed Gen. St. Clair, with heavy loss. They were finally defeated by Gen. Wayne, in 1794, and made peace in 1795. They afterwards rapidly declined. In the war of 1812 they again aided the English against the Americans, and suffered defeat. They left Ohio for Indiana in 1818, their numbers being 2000 to 3000. In 1846 they were removed from their Indiana reservations to Kansas, a few only remaining in Indiana and Michigan. They were placed on a reservation of 10,240 acres in the Fort Leavenworth agency. Very few remain there, many having gone to the Indian Territory, where they have joined the Peorias and Quapaws.

MICAH. See PROPHETS.

MICHELET, KARL LUDWIG, a German philosopher, was born at Berlin, Dec. 4, 1801. He is remotely of French descent, and was educated at the University of Berlin, taking his doctor's degree in 1824. He was appointed professor of philology in the French gymnasium, and held this post for 25 years. He had, in 1829, become professor of philosophy also in the University of Berlin. He devoted himself with ardor to the study and exposition of the works of Aristotle. Among his works in this department were *Die Ethik des Aristoteles* (1827); an edition of the *Nicomachean Ethics* (2 vols., 1829–35); and *Examen critique du livre d'Aristote intitulé Métaphysique* (Paris, 1836), which was crowned by the French Academy. During the political agitation of 1848–49, Michelet published numerous articles and pamphlets of a very liberal spirit. As a philosopher he started with Hegel, but diverged at some important points. He has endeavored to introduce a more marked Christian spirit. His views are shown in his *Geschichte der letzten Systeme der Philosophie in Deutschland* (1837–38); *Entwickelungsgeschichte der neuesten deutschen Philosophie* (1843); *Vorlesunge über die Persönlichkeit Gottes* (1841); *Die Epiphanie der ewigen Persönlichkeit des Geistes* (3 parts, 1844–52); *Das Naturrecht, oder Rechtsphilosophie als die praktische Philosophie* (2 vols., 1866); *System der Philosophie als exacter Wissenschaft* (4 vols., 1876–78).

See Vol. XVI. p. 246 Am. ed. (p. 237 Edin. ed.).

MICHIGAN, the thirteenth State admitted into the Union, was a part of the North-west Territory from 1787 to 1800, and of the Territory of Indiana from 1800 to 1805. It was organized as a separate Territory in 1805, the first governor being commissioned March 1. Its first State constitution was adopted in October, 1835, and the first election held under it in November following. The act of Congress of June, 1836, providing for admission, required assent to a change of its southern boundary as a condition, which assent—refused by a first convention held in September, 1836—was given by a second convention held in December, 1836, and admission was completed in January, 1837. In 1850 a revised constitution was adopted, materially changing the organic law. Under the constitution of 1835 the heads of the several executive departments and the chief judicial officers were appointed by the governor. These officers were made elective. The new constitution also prohibited the creation of any corporation other than municipal by special act, and required any general banking law to be submitted to the electors. It limited the contraction of debt by the State, and prohibited the State from engaging in works of internal improvement, or being interested in the stock of, or granting its credit to any association, company, or corporation. It also prohibited the granting of license for the sale of intoxicating liquors, a provision stricken out by an amendment adopted in 1876. In 1867 and in 1873 revised constitutions were rejected by the electors, and that of 1850, with amendments since made in accordance with its own provisions, remains the governing law of the legislative, executive, and judicial departments. The seat of government was removed from Detroit to Lansing in 1847.

Michigan made a prompt and earnest response to the call of Pres. Lincoln, dated April 15, 1861. An extra session of the legislature was held May 7, a loan of $1,000,000 authorized, and authority given the governor to raise ten regiments. May 13 the first regiment of infantry left the State for the front, fully armed and equipped; three more regiments and a battery of artillery went forward before the end of June, and other regiments followed in rapid succession. The contribution of the State to the Union army may be summarized: 90,747 officers and men, organized into 1 regiment of engineers, 14 batteries of light artillery, 11 regiments of cavalry, 30 regiments of infantry (3 of them reorganized for second terms of service), 1 regiment colored infantry, 1 regiment and 4 companies of sharpshooters, also 3 companies of horse to a Missouri regiment, Michigan's quota being full. The Michigan soldiers served in every part of the South and South-west, and won praise on every battle-field. The losses reported were: Officers killed, 177; died of wounds, 85; of disease, 96; total, 358. Men killed, 2643; died of wounds, 1302; of disease, 10,040; total, including 512 serving in regiments of other States, 14,097; total officers and men, 14,855; total number of commissioned officers, 4007.

Population.—Michigan entered the Union with 22 organized counties, and its first State census, taken in 1837, gave a population of 174,061. The U. S. census of 1840 showed a population of 212,267, and that of 1880 footed 1,636,937, advancing the State to the ninth rank, and entitling it to 11 representatives in Congress. In 1884 another State census was taken, the population aggregating 1,856,100, an increase of 219,163 over the census of 1880, or 10.38 per cent. Fifteen of the twenty counties constituting the southern three tiers showed a decrease, an indication that the centre of population is rapidly moving northward. There are now 82 organized counties and 49 incorporated cities. Eleven cities have each a population exceeding 10,000: Detroit, 133,269; Grand Rapids, 41,934; Bay City, 29,415; East Saginaw, 29,100; Jackson, 19,136; Muskegon, 17,845; Kalamazoo, 13,938; Saginaw, 13,767; Port Huron, 10,390; Manistee, 10,373; Battle Creek, 10,021. Fifteen other cities have a population of over 5000 each.

Finances.—Including balance on hand, Sept. 30, 1884, and receipts for the year, the State treasury had available funds for fiscal year aggregating $3,521,228.54. The payments were $2,730,976.98, leaving a cash balance, Sept. 30, 1885, of $790,251.56. The total bonded debt of State at same date was $243,149.97, of which $12,149.97 is overdue and draws no interest. $231,000 (the balance) falls due in 1890. To meet this debt the treasury holds as a sinking fund $297,000. The trust fund debt owing by the State (the accumulation of proceeds from the sale of agricultural college, normal school, primary school, and university lands) is $4,389,524.52. The specific taxes paid by railroad, mining, and other corporations—amounting in 1885 to $867,845.67—are set apart by the constitution to meet the interest on this debt, the excess to be added to the primary school interest fund, and distributed yearly to the school districts of the State. The current expenses of the State government, with all appropriations to State institutions for buildings, improvements, or support, must be met by an annual tax. The State tax levy for 1885 was $1,655,361.40, classified as follows:

For general purposes	$892,399.90
Michigan Soldiers' Home (new)	110,000
University buildings and expenses	96,500
Normal school	33,200
Agricultural college	35,100
Mining school in Upper Peninsula, not yet opened	15,000
State public school	45,000
Michigan school for the blind	36,920
Institution for deaf and dumb	70,425
Reform school for boys	75,000
State industrial home for girls	38,500
State prison	45,940
State house of correction	4,800
Asylum for criminal insane	31,250
Eastern asylum for insane	15,000
Michigan asylum for insane	$22,000
Fish commission	20,700
State board of health	2,000
Military purposes	64,963

The apportionment is made on an aggregate valuation of $810,000,000, and amounts to $2.04.3+ on each $1000 of valuation. The present valuation was made in 1881, and a new valuation will be made in 1887.

The lands held by the State, subject to entry, in September, 1884, were: Swamp-lands, 197,209.49 acres; primary school lands, 320,249.27 acres; agricultural college lands, 125,379.64 acres; asset lands, 200 acres; university lands, 180.47 acres; total, 643,218.87 acres. Amount due State at same date on part-paid lands, $556,550.16.

Taxation and the Liquor Traffic.—In 1875 the prohibitory liquor-law of 1855 was repealed and succeeded by a regulation and tax-law. As the law now stands it imposes taxes as follows: On retailers of spirituous or intoxicating and mixed liquors, $300 a year; on wholesale dealers, $500; on wholesale or retail dealers in malt, brewed, or fermented liquors, $200 a year, with a graduated tax on manufacturers. Selling without having paid the tax is prohibited under severe penalties; by untaxed druggists as a beverage; to minors, intoxicated persons, etc.; between the hours of 10 o'clock P. M. and 7 o'clock A. M., and on Sundays, election days, and all legal holidays. The operation of the law for the first year (1875), and for the last five years for which returns have been made, is shown in the following table:

Years.	Spirituous liquors.		Malt liquors.		Total.	
	Dealers.	Tax.	Dealers.	Tax.	Dealers.	Tax.
1875	2,991	$377,464.56	1,609	$60,240.96	4,600	$437,705.52
1880	1,958	370,088.20	1,742	117,475.39	3,700	487,563.59
1881	2,230	436,154.92	1,740	114,125.29	3,970	550,180.21
1882	2,714	786,972.88	747	131,670.09	3,461	918,642.97
1883	2,952	850,445.59	952	166,410.53	3,904	1,016,855.92
1884	3,000	864,577.08	1,180	194,321.77	4,180	1,058,898.85

The falling off in number of dealers in malt liquors and increase of tax in 1882 resulted from the retail tax being doubled by the law of 1881. The tax is paid into the treasury of the municipal corporation in which it is collected.

Railroads.—The first railroad corporation was chartered by the Territorial legislature in 1832, and immediately after the Territory became a State a grand scheme of internal improvements was mapped out. Several railroads and a canal projected, each to extend across the State, a loan of $5,000,000 made, and work commenced. The scheme proved a failure, and in 1846, with internal improvement warrants as low as 40 cents on the dollar, the Michigan Central completed only to Kalamazoo (143 miles), and the Michigan Southern to Hillsdale (66 miles), the roads were sold to corporations organized under special charters, and the State retired from the business of building and operating railroads. The 63 miles in operation at the end of 1838 had increased to 5220—exclusive of double track and sidings—at the end of 1885. The detailed official reports for 1884 covered the business of 60 companies, operating 5120 miles of road, of which but eight are credited with paying dividends, while five reported insufficient revenues to meet operating expenses. The capital stock representing this mileage is $278,792,854.31, of which only $10,758,760.71 is held in Michigan. The funded and floating debt is $345,787,796.36, increasing the capital account to $624,580,650.67. The cost is put at $577,183,132.06, showing an excess of stock and debt over cost of $47,397,518.61. The total earning for the year was $81,807,316.08; total expenses, $58,035,288.65. Number of passengers carried, 24,782,322, an average distance of 30.89 miles each, at an average fare of 2.72 cents per mile. The freight moved one mile was 6,164,447,358 tons, at a rate per mile of 90 cents a ton, the lowest rate in the railroad history of the State, and a decrease of 47 cents per ton from 1874.

Banking.—There are no banks of issue doing business under State laws, the taxation imposed by the national banking law having compelled a retirement of all circulation. July 1, 1885, there were 48 banks of deposit and discount in operation, the majority of them organized as savings banks, and having a paid capital of $3,394,170. Stockholders are individually liable to an amount equalling their respective shares, and "savings depositors" in savings associations or banks are preferred creditors. On Oct. 1, 1885, 102 banks were in operation under the national banking law. Their official reports for that date showed: Capital, $10,155,000; circulation, $3,479,715; loans and discounts, $21,321,908; due depositors, $18,575,061. But eleven States reported a larger national bank capital at that date.

Agriculture.—The number of farms in 1880 is given in the article on FARM. In 1885 there were 135,167 farms, containing 12,207,218 acres, and of improved land, 7,280,775 acres; average acres per farm, 89.95. Number of horses, 342,727; milch-cows, 348,412; other cattle, 379,981; hogs, 487,303; sheep, 2,353,718; acres of apple orchards, 237,702; of peach orchards, 11,327. The following table gives leading products for recent years:

	1882.	1883.	1884.
Wheat, acres	1,688,269	1,591,837	1,485,778
Wheat, bushels	32,568,688	23,578,388	24,999,577
Corn, bushels	47,454,135	16,544,978	47,454,135
Oats, bushels	19,025,764	19,271,182	25,831,525
Barley, bushels	904,235	739,706	950,675
Clover seed, bushels	160,677	93,523	294,527
Peas, bushels	489,591	435,230	851,410
Potatoes, bushels	11,078,796	8,932,397	14,548,737
Apples, bushels sold	2,300,350	1,409,790	3,272,047
Peaches, bushels sold	295,394	199,952	67,610
Hay, tons	1,365,252	1,872,186	1,648,665
Wool, pounds	12,737,343	13,373,803	13,827,542

For 1885 the acreage of wheat was 1,482,169, and the estimated yield 30,837,361 bushels, or 20.59 bushels per acre. The State is also a large producer of buckwheat, ranking fourth in the Union; according to the census of 1880, 413,062 bushels. The same census gives it the fifteenth rank in rye, with 294,918 bushels.

Minerals.—The product of the Lake Superior iron mines and furnaces for the years 1882–83–84, was as follows, in tons:

	Ore.	Pig Iron.	Ore and Pig.	Value.
1882	2,947,392	72,962	3,020,354	$26,270,205
1883	2,352,288	57,384	2,409,672	14,969,108
1884	2,455,924	57,297	2,513,211	13,921,491

The copper production was in 1882, 25,439 tons; in 1883, 29,850 tons; in 1884, 34,670 tons; and in 1885, 36,075 tons.

The salt product was as follows:

	Barrels.		Barrels.
1881	2,750,299	1884	3,252,175
1882	3,037,317	1885	3,297,408
1883	2,894,672		

Manufactures.—The U. S. census of 1880 furnishes the following statistics:

Number of establishments	8,873
Number of hands employed	77,591
Capital employed	$99,930,959
Wages paid during the year	25,318,682
Value of materials used	92,852,269
Value of manufactured products	150,692,025

In capital employed, the State ranked as the 8th, and in value of products the 9th.

Education.—The following table will concisely present the growth of the schools of the State, graded and ungraded:

Year.	Average number of days open.	Districts.	Teachers.	Children of school age.	Pupils enrolled.	Amount paid Teachers.
1836	70	55	98	2,337	2,377	$3,540.33
1840	90	1,506	1,870	48,817	47,901	42,310.46
1850	102	3,097	4,087	132,234	110,478	140,889.48
1860	124	4,087	7,921	246,802	193,107	468,988.50
1870	138	5,108	11,014	384,554	278,686	1,393,228.59
1880	150	6,352	13,949	506,221	362,196	1,917,983.99
1882	148	6,630	14,467	538,802	385,504	2,193,902.93
1884	152	6,817	15,251	577,044	404,718	2,682,568.58
1885	150	6,932	15,358	595,687	411,954	2,785,280.16

The number of school-houses in 1885 was 7164, and the total value of school property, $11,267,056.00. The school and fiscal year 1883–84 was closed with a balance in hand, in district treasuries, of $1,012,722.44. The receipts for the year 1884–85 were: from primary school interest fund, $705,663.84; from the mill tax, required to be levied by the officials of each city and township, $679,279.75; from district taxes, voluntarily voted, $2,700,030.23; from other sources, $605,716.69.

The State is also a liberal promoter of higher education, and in addition to the interest on the sacredly guarded trust funds, accruing from the sale of lands coming from the general government, it has appropriated and disbursed in its aid, to distinctively State institutions, as follows: To the University at Ann Arbor, for buildings, furnishing, apparatus, and current expenses, $1,146,871,601; to the Normal School at Ypsilanti, $501,442; to the Agricultural College at Lansing, $687,973.

The charitable institutions, all save the Soldiers' Home classed as educational, have received by direct appropriation: State Public School at Coldwater, $598,116; Institution for the Deaf and Dumb at Flint, $1,337,184; School for the Blind at Lansing, $261,392; Michigan Soldiers' Home at Grand Rapids, organized in 1885 and not yet in full operation, $10,000.

The asylums for the insane have received: Michigan Asylum at Kalamazoo, $1,854,143; Eastern Asylum at Pontiac, $1,040,594; Northern Asylum at Traverse City, $341,100; Asylum for Criminal Insane at Ionia, $80,158. The several counties pay for the support of their own insane poor in the asylums, and insane, not dependent upon the public, are maintained at private expense. Sept. 30, 1884, the Michigan Asylum had 804 inmates; the Eastern Asylum 635, and the Northern Asylum was not then open.

The disbursements to the reformatory and penal institutions have been: to State Reform School for Boys at Lansing, $1,071,656.18; to Industrial Home for Girls, Adrian, $258,977.57; to House of Correction, Ionia, $673,019.53; to State Prison, Jackson, $1,076,515.33. The inmates of these institutions, Sept. 30, 1884, were: Reform School, 440; Home for Girls, 157; House of Correction, 750; State Prison, 670, of which number 60 were life convicts. Capital punishment was abolished in 1847. Females, convicted of felony, are sentenced to the Detroit House of Correction, a municipal prison, or if for a crime involving a life sentence, to the State Prison, and transferred to the Detroit House of Correction by commutation of sentence. Each of the educational, charitable, and penal institutions is managed by an independent board, the State Board of Corrections and Charities having a general advisory supervision of all save the educational. The disbursements given for each class of institutions are to Sept. 30, 1885. (E. B. P.)

MICHIGAN, **Lake**. One of the great lakes of the St. Lawrence Basin, and the largest body of fresh water lying wholly within the limits of the United States. It lies E. of Wisconsin, S. and W. of Michigan, and its southern extremity forms a part of the boundary of Illinois and Indiana. It is 345 miles long, and its greatest breadth is 84 miles; its area is 22,120 square miles, and its elevation (589 feet above sea-level) is almost identical with that of Lake Huron, into which its waters flow through the Straits of Mackinaw. The maximum depth is stated to exceed 840 feet. The principal bays are Green Bay, in Wisconsin; Great Bay des Noquets, and Little Bay des Noquets, the northward extensions of Green Bay; and the Great and Little Traverse Bays, on the Michigan side. All these bays lie towards the north, and they afford almost the only good natural harbors on the lake. The islands are not very numerous, and all are in the northern part. The principal tributary rivers are: from Wisconsin, the Peshtigo, Oconto, Fox, and Milwaukee; from Illinois, the Chicago and Calumet (of which the former, being artificially deepened and connected by canal with the Illinois River, has ceased to act as a tributary, and now carries out a part of the waters of the lake, its current being reversed); from Michigan, the St. Joseph, the Grand, the Kalamazoo, the Muskegon, the Manistee; from the north peninsula of Michigan, the Manistique, the Sturgeon, the Whitefish, the Escanaba, the Ford, and the Menominee. Several of the tributary rivers are navigable; nearly all those from the east have bars at their mouths, and discharge their waters through small lakes or lagoons, which in several cases have been converted into artificial harbors. The chief ports and towns on Lake Michigan are Chicago, Evanston, and Waukegan, in Illinois; Michigan City, in Indiana; New Buffalo, Benton Harbor, South Haven, Holland, Grand Haven, Muskegon, Ludington, Manistee, Traverse City, Petoskey, Manistique, Escanaba, and Menominee, in Michigan; and Oconto, Fort Howard, Green Bay, Manitowoc, Sheboygan, Milwaukee, Racine, and Kenosha, in Wisconsin. The harbors or ports of several of these towns are either wholly or in part artificial. Lake Michigan is navigated by great numbers of steam-vessels and sailing-craft, and its fisheries are important.

MICHIGAN, STATE UNIVERSITY OF. The ordinance of 1787 declared that "schools and the means of education should forever be encouraged" in the North-western Territory. In harmony with that declaration the act of Congress in 1805 organizing the Territory of Michigan set apart a township of land for the endowment of a university. When twelve years later the territorial authorities sought to select the lands thus given, they found grave complications in respect to the titles of lands which had been held by Indians. At their request Congress passed an act, May 20, 1826, cancelling the first grant, and setting apart two townships for the university. That grant forms the original endowment. The sale of lands has yielded $492,863. The income from this fund is about $38,000. A plan for a university was adopted in 1817 by the governor and the people of the Territory. This was modified in 1821, and materially changed again when the Territory became a State in 1837. The constitution provided for the establishment of a board of regents, consisting of the governor, lieutenant-governor, and judges of the supreme court, and of 12 other persons to be appointed by the governor and the Senate. The new State constitution of 1851 provided that a regent should be elected by popular vote in each judicial circuit, but in 1863 the present system was introduced, by which each second year two regents (there being eight in all) are chosen by popular vote of the whole State. The president is not a regent, but presides at the meetings of the board. Except in the use of funds furnished by legislative appropriation the regents are free from legislative control. In 1837 the first board of regents organized and made plans for the departments of literature, science, and the arts or the collegiate department, but arrangements for the reception of students were not completed until September, 1842. The professors in turn discharged the duties of president until 1852, when Henry P. Tappan was elected president. In 1863 he was succeeded by E. O. Haven, D. D. After his resignation in 1869 Henry S. Frieze, LL. D., was acting president until 1871, when the present incumbent, James B. Angell, LL. D., was elected president. The department of medicine and surgery was established in 1849, the department of law in 1858, the school of pharmacy, which had been a part of the department of literature, science, and the arts since 1869, received an organization as a separate department in 1876, the homœopathic medical college was established in 1875, and the college of dental surgery in the same year. Since 1867 the legislature at each session has made generous appropriations for buildings and other needs of the university. In 1873 it passed an act granting the institution the proceeds of a tax of $\frac{1}{20}$ of a mill on the taxable property of the State, which yields now annually $40,500. The total appropriations made by the State up to date (1886) amount to $961,171. The citizens and the city of Ann Arbor have also made valuable contributions to the university. Its regular annual income is made up as follows: proceeds of United States grant, $38,000; $\frac{1}{20}$ mill tax, $40,500; receipts from students about $60,000; total, $138,500. The legislature rarely appropriates less than $50,000 a year for specific purposes. The total number of professors, instructors, and assistants on duty in 1886 is 85. The number of students is 1397, distributed as follows: literary department 594, medical 326, law 285, pharmacy 61, homœopathic 49, dental 82. The number of students graduated in 1885 is 363. The total number of graduates down to 1885 is 7775. Women were admitted to all departments in 1870. The fees charged are, matriculation fee, to a resident of Michigan $10, to non-residents $25; the annual fee, literary department, residents of Michigan $20, non-residents $30; the professional schools, residents of Michigan $25, non-residents $35; graduation fee in all departments $10. The libraries contain in the aggregate 57,300 volumes and 12,000 pamphlets, including the Parsons library of political science, containing 4325 volumes and 5000 pamphlets, and the McMillan Shakespeare library containing 3000 volumes, and the special library of the school of political science containing 2600 volumes. The scientific museums contain about 6000 mineralogical specimens, 41,000 geological specimens, 70,000 botanical specimens, and 255,000 in natural history. The industrial museum contains the whole of the exhibit sent by the Chinese government to the New Orleans exposition. The astronomical observatory is thoroughly equipped for its work. The late Prof. Watson, while director, discovered 19 asteroids and comets. The chemical laboratory has 269 tables. There are also physical, geological, zoölogical, botanical, microscopical, histological, physiological, engineering, and dental laboratories. The engineering laboratory contains shops for mechanical work. Each medical school has a well-appointed hospital. The art gallery has lately been made the recipient of two valuable gifts, viz., all the models and casts, more than 100 in number, of the eminent sculptor, Randolph Rogers, presented by him, and more than 700 pictures and some pieces of statuary collected by the late H. C. Lewis and bequeathed by him to come to the university after the decease of his wife. For the last sixteen years students have been admitted without examination from high schools visited and approved by the faculty. Attendance upon religious exercises, including those in the college chapel, is voluntary. There are no dormitories. The regular course of instruction in the literary department usually covers four years, but may be completed by enterprising students in three and a half, the law course and the pharmacy course each two years, and the other professional courses each three years. In the literary department are included all the work in civil, mining, and mechanical engineering and in the school of political science. In that department about 250 different courses of instruction are given. The degrees of A. B., Ph. B., B. S., and B. L., and the various engineering degrees are bestowed; also, on examination, masters' and doctors' degrees. In all the work but the scientific and engineering courses the student is allowed to elect about one-half his studies. What is known as "the seminary" method of instruction, which is borrowed from the German "Seminar," is largely used for advanced students. For further details see Ten Brook's *State Universities*, C. K. Adams' *Historical Sketch of the University*, Farrand's *History of the University*, and the *Annual Calendar* of the University. (J. B. A.)

MICHIGAN CITY, a city of Indiana, in La Porte county, is on Lake Michigan and on the Michigan Central Railroad, 58 miles E. of Chicago, and is the N. terminus of 2 lines of trunk railway. It has a good harbor and docks, and is the seat of a large lumber trade. It is the seat of the Northern Indiana prison. The city has 3 hotels, 1 national and 1 other bank, a daily and 2 weekly papers, railway shops, 17 churches, and carries on manufactures of cars, furniture, refrigerators, and many other kinds of goods. It has gas- and water-works and a park. Its total valuation is $2,500,000; city debt, $32,000. It was settled in 1830 and incorporated in 1850. Population in 1870, 3985; in 1880, 7366.

MICMACS, the most easterly tribe of Algonkin Indians, and the first with which the English came into contact. The Indians who were taken to England by Cabot in 1497 were probably Micmacs. They inhabited New Brunswick, Nova Scotia, Prince Edward's Island, and Newfoundland, and had long been engaged in war with the Esquimaux north of the St. Lawrence. After the French colonization they became partly civilized, and were converted to Catholicism. They long remained allies of the French against the English. They even captured vessels on the coast, drove off two English armed ships, and cruised along the New England coast, attacking towns and doing much damage. Their hostility to England ceased in 1760, when their territory became an English province. They are now chiefly on reservations in Nova Scotia and New Brunswick. In 1873 they numbered 3600. Protestant missions have existed among them for 20 years past.

See Vol. XVI. p. 268 Am. ed. (p. 258 Edin. ed.).

MICROSCOPE. When the Wilkes U. S. exploring expedition sailed in 1840, not a single serviceable microscope could be found for sale in the United States, and the expedition borrowed one. Charles A. Spencer, of Canastota, N. Y. (1813–1881), with an academical education, and such information as he could obtain from encyclopædias and similar books, made the first American microscope in 1847, which compared very favorably with the best foreign instruments then in this country, and in 1851 he produced a $\frac{1}{16}$ objective of larger angle of aperture than any before made. Finding his glass inferior, he experimented until he could make his own of better quality than he could buy. Robert B. Tolles, of Boston (1822–1884), a pupil of Spencer, demonstrated the value of homogeneous immersion-lenses in 1871, and in 1872 constructed some objectives for the Army Medical Museum, of Washington, D. C., better than any others then known. He also made many minor inventions relating to the microscope, and built some superior telescopes of extremely short focal length. J. J. Woodward (1833–1884), surgical director of the Army Medical Museum, Washington, D. C., finding photographs of tissues as magnified very useful in recording the appearance of diseased structure, devoted much time to this branch of microscopy, and produced an unequalled series of micro-photographs. Preparations for the microscope are preserved on glass slips, usually 3 x 1 inch, covered by a piece of very thin glass, fastened by Canada balsam, shellac, asphalt, or other cement. The preparations are often thin sections of animals or vegetables, cut by a microtome. The latter was at first a spool-shaped piece of iron, with a micrometer-screw working through one end, which forced the material above the surface of the other end, where it was sliced by a razor. Microtomes are now made more complex, and capable of working to .001 of an inch, or less if required, and giving continuous ribbons. After the slices are cut, they are often stained before mounting. The principal staining fluids are ammoniacal solution of carmine, hæmatoxylon, and the various aniline dyes. Silver nitrate, osmic acid, and other compounds are used for special purposes. Dr. J. Gibbons Hunt, of Philadelphia, commenced double-staining vegetable tissues in 1853, by immersion in different dyes having selective affinity for different portions of the tissue. The first published articles on this subject are by Dr. George D. Beatty, of Baltimore, in *Cincinnati Medical News* and *Monthly Microscopical Journal* (1875). A full review of the subject of staining, by Gierke, will be found in *American Monthly Microscopical Journal* (1880–86). Nearly all organic substances require to be embedded or surrounded with a medium. Canada balsam is most generally used, but glycerine, salicylic acid solutions, and many others are employed. When well mounted, microscopic preparations are permanent. Some are now in collections a century old. Copious American contributions to microscopic literature will be found in the monthly and quarterly microscopic journals of London, England, especially from 1870 to 1875. The various American scientific journals contain many articles. The *Lens* (Chicago, 1872–73) was the first American periodical exclusively devoted to microscopy.

The *American Journal of Microscopy* (1876–81) and *American Quarterly Microscopical Journal*, Washington, D. C., since 1878, now a monthly, represent our periodical literature. Nearly every large city has its microscopical society, chiefly dating from 1870. The American Society of Microscopists was organized 1877, meets annually in different cities, and publishes proceedings. The American Postal Microscopical Club, organized 1874, is a circulating library of microscopic preparations, which are sent in special packages through the mails. The universal application of the microscope in the arts and sciences has caused special attention to be given to machinery adapted to micrometric measures, or as they are sometimes called, measures of precision. The unit of measure is a microw (u = 0.001 m m). Nobert, of Prussia, was among the first to rule 100,000 lines to the inch on glass, but his methods are unknown. C. W. Fasoldt, of Albany, has a machine capable of doing finer work. Wm. A. Rogers, of Cambridge, Mass. (see *American Journal of Science*, series III., vol. XIX., 1880, p. 54), by a systematic study of the errors of ordinary ruling-machines and their work, succeeded in constructing a machine capable of regulation to .0000001 of an inch. Such machines relate to diffraction gratings (optics), to micrometers, that is, scales used in connection with the microscope, and to the standard measures and templates used in making watches, and especially in making the dies and taps for cutting the screws which are so abundantly used in all kinds of mechanical work at the present time. The general use and the perfection of the microscope has thus reacted on the most ordinary machine work, until in some machine shops the limit of variation for standard work is .001 of an inch.

The microscope has recently been applied with great success to the study of rock-structure by grinding down thin sections, which become thereby nearly transparent, and by micro-chemical reactions. For this work special instruments have been made by many opticians, as Fuess, of Berlin, Nachet, of Paris, and Bullock, of Chicago. The particular construction relates to devices for accurate goniometrical measurements and the ready management of the polarizer. See Zirkel, *Microscopical Petrography;* vol. VI. King's *Exploration of the 40th Parallel;* Rosenbusch, *Mikroskopische Physiographie;* and Hussak, *Determination of Rock-forming Minerals.* Translated by Smith (New York, 1885).

(W. H. S.)

MIDDLETON, Arthur (1743–1787), an American patriot, was born near Charleston, S. C., in 1743. He was descended from Edward Middleton, a native of Twickenham, England, who settled in South Carolina and was a member of the governor's council in 1680. Arthur was educated in England at Harrow and Westminster schools and at the University of Cambridge. On the approach of the Revolution he was a member of the first council of safety, and in 1776 was a delegate to Congress, where he signed the Declaration of Independence. In 1779 he fought against the British, and in 1780, being made a prisoner by them, was confined first at St. Augustine, later at New York. After being exchanged he again entered Congress, where he noted in short-hand many debates. He died Jan. 1, 1787.

His son, Henry Middleton (1771–1846), was governor of South Carolina, 1810–12, member of Congress, 1815–19, and U. S. minister to Russia from 1820 to 1831.

MIDDLETOWN, a city of Connecticut, one of the shire towns of Middlesex county, is on the W. bank of the Connecticut River (here crossed by an iron railway bridge), 15 miles below Hartford. It is at the junction of 3 railway lines, and is the seat of several important institutions, including the Connecticut Industrial school for girls; a large State insane hospital; the Wesleyan University, a flourishing institution, founded in 1831; and the Berkeley Divinity School (Episcopalian), established in 1854. These institutions occupy commodious buildings, chiefly standing upon the elevated grounds near the town. Middletown has 2 parks, 4 hotels, 4 national and 2 savings banks, 2 daily and 2 weekly newspapers, 10 churches, and many good public and private schools. The city carries on manufactures of a large variety of goods. Its streets are wide and well shaded, and are lighted with gas and electricity. The water-supply is under the control of the city. The tax valuation is $6,000,000; public debt, $270,000. Middletown is a port of entry. It was settled in 1650 and incorporated in 1784. Across the river is Portland, noted for its brownstone quarries. The population of Middletown in 1880 was 6826.

MIDDLETOWN, a town of New York, in Orange county, stands in the fertile Walkill Valley at an important railroad junction, 66 miles N. N. W. of New York. It is the seat of the State Homœopathic Insane Asylum, has an academy and union school, 8 churches, 1 savings and 3 national banks, large hotels, an opera-house, 2 daily and 3 weekly newspapers, gas- and water-works. There are important manufactures of iron, and of hats, saws, blankets, files, farming implements, and other goods. It is the chief market for an excellent dairy and farming region. The population in 1870 was 6049; in 1880, 8494.

MIDHAT PASHA (1822–1884), a Turkish statesman, was born in Bulgaria in 1822. In 1839 he entered the civil service, and afterwards assisted in various reforms in the provinces. In 1857 he succeeded in suppressing brigandage in Roumelia, and was then made a member of the ministry. He visited other countries of Europe to study their administration. In 1860 he was made pasha, and afterwards drew up the "Law of the Vilayets" by which the civil and criminal procedure was greatly improved. This law went into operation first in 1864 in Bulgaria, where he was highly successful as governor-general. After a short service as governor of Bagdad, he was made grand vizier; but his attempts at reform were baffled by the court party. In 1876 he took part in deposing Abdul Aziz (*q. v.*), and again Murad V., who was declared insane. Under Abdul Hamid II. (*q. v.*) he was at first grand vizier; but was soon banished, and went to London. He afterwards was allowed to return, and in 1878 was made governor-general of Syria. In 1881 he was tried for complicity in the murder of Abdul Aziz, and was condemned to death; but by diplomatic intervention the sentence was commuted to banishment to southern Arabia. He died there May 8, 1884.

MIFFLIN, Thomas (1744–1800), an American statesman, was born at Philadelphia in 1744, of Quaker family. He was educated at Philadelphia College, and became a merchant. In 1772 he was elected to the legislature, and in 1774 to Congress. Entering the Revolutionary army, he was made brigadier-general in 1776 and major-general in 1777. He was again elected to Congress in 1782, and was its speaker in 1783. He was a member of the convention which framed the U. S. Constitution in 1787, president of the Executive Council of Pennsylvania 1788–90, and governor of the State 1791–1800. He died Jan. 21, 1800.

MIGNE, Jacques Paul (1800–1875), a French editor, was born at Saint Flour, Oct. 25, 1800. He studied theology at Orléans, and was ordained priest in 1824. Having had some difficulty with his bishop, he removed to Paris in 1833, and founded *L'Univers Religieux* as an impartial Catholic journal. In 1836 he disposed of this paper, which has since become famous under the shortened title *L'Univers*. Abbé Migne now devoted himself to republishing in cheap form the works of ecclesiastical writers, ancient and modern. He founded an immense printing establishment, and joined with it a store for the sale of all kinds of ecclesiastical goods. Among the collections issued by him were *Patrologiæ Cursus*, *Encyclopedie Théologique*, and his *Bibliothèque*, each containing hundreds of volumes. In 1868 his vast establishment was destroyed by fire, the loss amounting to nearly 7,000,000 francs. When he had become immersed in business, his priestly functions were revoked by the archbishop of Paris. He died at Paris, Oct. 25, 1875.

MIGNET, François Auguste Marie (1796–1884), a French historian, was born at Aix, May 8, 1796. He was educated there and at Avignon, and had commenced the study of law, when the gaining of prizes for literary works diverted him from his proposed course. In 1818 he gained a prize from the Academy of Nîmes for his *Charles VII.*, and in 1821 one from the Academy of Inscriptions for an essay on the government and legislation of France in the time of Louis IX. He now went to Paris, where he was soon joined by M. Thiers, with whom he had formed friendship while at college. Mignet became an editor of the *Courrier Français*, and also delivered at the Athenæum historical lectures which had great success. He published in 1824 his *Histoire de la Revolution Française de* 1789 *à* 1814, a series of brilliant sketches, which set forth more clearly his philosophical deductions. His prominence both as historian and journalist drew him into difficulties with the government. In 1830 he joined with Thiers and Carrel in founding the *National*, as the organ of the liberal opposition. After the revolution of 1830 Mignet was made director of the archives in the department of foreign affairs, a position most favorable to historical research. He retained this place until the overthrow of Louis Philippe in 1848. He was chosen a member of the Academy in 1836, and received several marks of honor. He died at Paris, March 24, 1884. Among his publications are *Negociations Relatives à la Succession d'Espagne* (4 vols., 1836–42), which really forms a history of the reign of Louis XIV.; *Vie de Franklin* (1848); *Histoire de Marie Stuart* (1851); *Charles Quint, son abdication* (1851); *Éloges Historiques* (1864).

MILEAGE is defined as fees paid officials for their travelling expenses by the mile. The first act passed by Congress under the Federal Constitution provided that each senator and representative should be entitled to receive $6 for every day of his attendance, and mileage at the rate of $6 for every 20 miles of the estimated distance, by the most usual road, from his place of residence to the seat of Congress. It was asserted that this allowance of mileage was not designed to be limited to the expense of travelling incurred by the individual members of Congress, but would enable them, if they chose, to bring their wives to the seat of government. The inequality of mileage paid was met by a more than corresponding inequality of distance from business, homes, and families, and the constant disruption for one-half of the year of all domestic relations and endearments.

After the seat of government had been permanently located in the District of Columbia, mileage had an influence on its continuance there. The continuance of a liberal compensation for the fatigues of travelling reconciled senators and representatives from remote States of the Union to the distance from their respective homes. It was just that they should receive larger amounts of mileage in addition to their pay to approximate an equality of compensation. As steam was gradually introduced, the great rivers and bays were made routes of travel, often circuitous, and some members of Congress would draw enormous mileage. There would often be a difference of several hundred dollars between the mileage accounts of a senator and a representative residing in the same county, who journeyed to the national metropolis by different routes.

In 1816 Congress enacted a law by which, instead of the daily compensation previously allowed, $1500 per annum were to be paid to each senator and representative, in addition to the mileage, for his services. This was very unpopular, and the act was repealed at the ensuing session. The pay was fixed at $8 per day, with $8 mileage for every 20 miles of distance, estimated by the most usual route. Once an attempt was made to have the mileage computed in a direct line, "as the crow flies," between the congressman's residence and the national capital; but this was abandoned, and gross abuses were gradually sanctioned.

When Horace Greeley was elected a representative in Congress in 1848, he became acquainted with the facts concerning mileage, and published them in the *New York Tribune.* The article created a great sensation at Washington, and a committee of investigation was ordered by the House of Representatives, which made a white-washing report, taking the ground that each member of Congress was the best judge of what was the usual route between his residence and Washington City. Mr. Greeley, in a subsequent speech, defended his position. He showed that the shortest mail route between New Orleans and Washington City was 1172 miles, while the congressional mileage allowance was for 2357 miles; and he went on to inform the House that those representatives who had so bitterly assailed him for the *Tribune* article had all pocketed much larger sums than they were entitled to. Not only were these large sums drawn for mileage, but when a called session of a new Congress followed the expiration of its predecessor without any interval, the senators or representatives who belonged to both drew constructive mileage for an imaginary journey to and from their homes, often amounting to several thousand dollars for those representing constituencies on the Pacific coast.

In August, 1856, a law was enacted changing the per diem to an annual rate of compensation, and providing that mileage should only be paid for two sessions of each Congress. The next year Congress adopted the table of mileage used at the executive departments, which remedied many of the abuses. In 1873 the salaries of members of Congress were raised to $7500 per annum, "with actual individual travelling expenses from their homes to the seat of government and return by the most direct route of usual travel." In January, 1874, this act was repealed, and mileage has since been paid under the old law. The annual cost of Congressional mileage is: for senators, $33,000; for representatives and delegates, $110,624; total, $143,624. The largest sum paid to any one member of Congress is $1440, which is received by a senator from Oregon, and the smallest sum paid is $8.40, which is received by a representative from Maryland.

Mileage is also paid to officers of the army and navy when they are travelling under orders. For many years it was 10 cents per mile; then, about 1 7 . it was "actual individual travelling expenses," but this gave no end of trouble, and a rate of 8 cents per mile was fixed, in accordance with a government table of distances. Clerks and employés of the executive department receive their actual travelling expenses, and their accounts are closely scrutinized, that illegal items may be disallowed. (B. P. P.)

MILES, Nelson A., an American general, was born at Wachusettsville, Mass., Aug. 8, 1839. He entered the civil war as lieutenant in the Twenty-second Massachusetts volunteers, in October, 1861, distinguished himself in McClellan's Peninsular campaign, and became adjutant-general of a brigade. In September, 1862, he was made colonel of a New York regiment, which he commanded at Fredericksburg and Chancellorsville. At the latter he was severely wounded, and at the time it was supposed fatally. He was made brigadier-general in May, 1864, and was distinguished in the subsequent campaigns until the fall of Richmond. He was made colonel of the Fortieth infantry U. S. A. in July, 1866, and became noted as an Indian fighter. He received brevets as brigadier- and major-general in 1867, and in March, 1869, was placed in command of the Fifth infantry.

MILITARY ACADEMIES. According to the ideas which prevailed before the time of Napoleon, under the rules of chivalry, the recognized code of honor hindered an opponent from taking advantage of his adversary. A battle then was generally a fair and open fight; therefore great prowess or strength, endurance, and excess of numbers were the most important elements in a given contest. But under Napoleon, and since, *strategy* has played a most important part. Strategy often enables the abler commander with a smaller force to defeat and put to rout his adversary. The rules and requirements of strategy are based on scientific knowledge, and certainly such knowledge can only be obtained by careful research on the part of those officers who may be held responsible for a campaign, and hardly less so on the part of others who must be prepared to understand and properly execute the details of service.

Hence the military schools. They sprang up at about the same epoch among all civilized nations. The changing conditions of modern civilization have produced marked changes in warfare, so that now modern warfare calls into requisition nearly every branch of science and uses the arts without stint. So clearly is this the case that in the profession of arms, as in medicine, it has become necessary to divide up and foster study in specialties, for it is impossible for the same individual to master all branches with their technicalities. Certainly the highest efficiency is never obtained except by the ablest men devoting their energies, as in law and medicine, to a portion of the vast subject. It is plain that "arms" demand instruction that cannot be afforded in civil schools. The very foundation-studies must be carefully selected with a view to the subsequent structure. After the foundation, the military education demands a knowledge of the organization of armies, their discipline, tactics, subsistence, and armament, methods of defensive and offensive operations, and a careful and thorough comprehension of military history. Each of these divisions, or others that are made, involve years of patient study. Early in the eighteenth century the necessity of both military and naval instruction was plainly felt, and so, as was natural, during that century the nations of Europe began a number of schools for this purpose. Soon the results in practical knowledge there gained became apparent in every arm and justified the putting of them on a permanent basis. These schools, with steady improvements and enlargements, have been continued till the present time; also others, some in Europe and many in America, have since been added; and one may well predict that the necessity for them has not yet passed, nor will it for years to come.

In 1741 Great Britain founded the Royal Military Academy at Woolwich. Here it was designed to educate officers of the engineers and the artillery. In order to obtain young men of good ability competitive examinations were established, but sundry conditions were imposed, either before or after the examination, conditions which limit the competition far more than is done in the United States. For example, all except the "Queen's Cadets," instead of being paid, are required to pay something for the privileges of entering and studying at this school. The Civil Service Commission, which conducts the examinations, virtually limits the selections to sons of officers and young men coming from the aristocracy and wealthy citizens.

The time of instruction is 2½ years. The course comprises mathematics, chemistry, physics, drawing, reconnoissance, fortifications, military history, geography, and the French and German languages. The requirements for entering this academy comprise a multitude of studies; however, for tests, usually but 4 or 5 branches are selected.

In 1799 the Royal Military College at Sandhurst was opened. It has been devoted to the purpose of educating officers for the infantry and cavalry. What is called the "Staff College" at Sandhurst is an arrangement for the selection of staff officers. Admission is secured by competitive examination from both the officers of the line and engineers. Besides these named, England has several other Military Schools, notably the Chatham School for Military Engineering; the Woolwich Artillery School; the School of Gunnery, at Shoeburyness; the "Survey Class" of Aldershot; and the School of Musketry at Hythe.

Germany has a number of prime military schools; in fact, one for each army division. They are found at Erfurt, Neisse, Metz, Potsdam, Hanover, Cassel, Anclam, and Engers. The candidates are usually taken from the army and are required to have served at least six months as privates or non-commissioned officers. Very frequently the young men enlist with a view of entering this school, and are known as "candidates." The colonel nominates the eligible candidate. On the nomination he enters the military school for his division without further examination. He is required to complete and master the course to become an officer. The course is less than a year.

There are also institutions in the nature of post-graduate schools where the higher instruction of officers is given; for example, the Berlin "War Academy." This is open to all meritorious officers who have served 3 years in the line. It demands an entrance examination, the competitive method being used. The course lasts 3 years, giving a very complete education in every distinctive branch of military service, and fitting them for high commands.

At Berlin there is also a military school, denominated "Senior-Cadet." For supplying this institution there are 6 tributary, called "Junior-Cadet" schools. The junior course is 4 years. The senior school demands 2 years; or 1 year, giving the second to the "War Academy." These 3 classes of schools—junior, senior, and war academy—have at the same time under instruction from 2500 to 3000 pupils. The range of instruction is very full and complete, embracing, as they do, foundation studies, ethical teaching, and the professional course.

In France, even before the Seven Years' War, there was a school for artillery officers, more or less exacting, in every garrison where a sufficient number of artillerymen were stationed. But these, at best, were irregular and incomplete. Louis XV. founded the first distinctive military schools in France. He opened the first one in 1751, at Vincennes; and the second at La Flèche, in 1764. The Vincennes school was removed to Paris, and subsequently, in 1799, was reorganized under Napoleon. It was the foundation of the present polytechnic institution, probably the most thoroughly technical and best school of the kind in the world. It has for its object the fitting of officers for the various branches of the government service. Through competitive examination, admission is open to all. Candidates, however, must have the degrees of A. B. or A. M., and be bachelors of literature; further, if not from the army, the ages must be from 16 to 20; if from the army, they must be between 16 and 25.

The Military School of St. Cyr is situated near Versailles. It was founded by Napoleon, in 1802, at Fontainebleau; soon after this he removed it to St. Cyr. Here officers of the cavalry, infantry, and marine corps are educated. The course is especially professional, though not particularly scientific. It admitted in 1875 about 700 pupils, and its course is 2 years in length. Its ablest graduates generally compete for entrance to the "Staff School" at Paris. France has also the Cavalry School at Saumur, and at Fontainebleau a school for engineers and artillery.

The other nations of Europe have similar establishments, with a selection and range of studies about the same. As it is necessary for a nation's independent existence to have efficient standing armies, so is it essential to have those armies well officered. And certainly the military education of these schools, in different nations, keeps up the equipoise.

In the United States the first military school of any importance was "The Military Academy." In the very beginning of the Revolutionary struggle the necessity for trained officers was apparent. A committee of the Continental Congress, which was in session at Philadelphia, was instructed to report upon the state of the existing forces. After examination they recommended that a military school be established for the purpose of educating officers. But nothing was done until 1794, when a number of "cadets" were selected, and for instruction were attached to the artillery and to the engineers.

As the next step, Congress, by an act in 1802, laid the foundation of an academy, and located it at West Point, N. Y., on the Hudson River. It consisted at first of 50 cadets, 40 being attached to the artillery and 10 to the engineer corps. In 1808 the pupils were increased to 156, and in 1812 the number was limited to 260. Four military professors, at this time having no assimilated rank, were appointed; these were in addition to the regular officers who were acting as instructors. The U. S. army then numbered 10,000 men. Six years later, in 1818, a system of discipline and training was adopted which is substantially that of to-day. The rules of merit and demerit, then introduced, are usually denominated the "Thayer System," because the then superintendent, Maj. Sylvanus Thayer, formulated them and set them in operation.

The spot chosen for the Military Academy is indeed beautiful for situation. Its buildings occupy a high plateau amid the Highlands of the Hudson. There is perhaps no scenery more picturesque and grand, and the place, with its rugged surroundings, has much historic interest. Till recently it has been cut off from immediate contact with the busy world, and so has furnished to the students the separation and quiet necessary for the close study demanded of them. Recently a railroad has tunnelled its way beneath the plain for parade and drill, and the railway station close at hand has intruded upon its coveted isolation. The present structures, mainly built of stone, are complete and adequate. The apparatus and other appliances in each department are good, and mostly kept up to the modern standard.

The number of cadets is made up by allowing 1 for each congressional district, 1 for each Territory, and 10 to be appointed at large by the President. For many years an interpretation of the law gave the President 40 cadets to be at the academy at the same time, but of late an explanatory act limits the number to 10. Except the President's appointees each cadet is nominated to the secretary of war, by his representative, or by his territorial delegate in Congress. The total thus furnished should be 343, but owing to circumstances and casualties, explained further on, the number never reaches the maximum. It averages about 275.

Many candidates are rejected at the severe preliminary or entrance examination. Only the common English branches are required for entrance, yet the knowledge in them must be precise and thorough. The ages of candidates range from 17 to 22. Subsequent to admission the matriculation demands an oath to support the United States, its Constitution, and its laws, in preference to those of any individual State. The young men selected come from all classes of society. In order to bring out the individual merit the representatives and delegates frequently base their selection upon competitive examinations. These are held in the districts from which they come. The object of keeping the requirements of the entrance examinations to the common branches is to widen the field of selection. In parts of the country the school privileges are much better than elsewhere. Once within the institution the sons of officers of rank, of senators in Congress, and of wealthy men, are obliged to mingle freely, on terms of equality, with the sons of farmers and artisans. Even indigent circumstances, fortunately, never exclude an appointee. The examinations for admission are held in June and August. The great majority of candidates present themselves for the June examination. A large percentage is rejected. Then again new appointments can be made to fill the vacancies so created.

The government bears the entire expense of a young man after he becomes a cadet, his pay being $540 per year. Strict military discipline at once sets in. The rules and articles of war and the academic regulations are imposed. The so-called regulations derive their authority from the laws of Congress. The cadets are really regarded as officers, holding commissions of the lowest grade, and so the demand of obedience requires duty at such places and upon such service as the President may direct.

Organization.—The entire cadet corps for military exercises is organized into a battalion of four companies, which are completely officered from the cadets themselves. The captains, lieutenants, the adjutant, and the quartermaster are appointed from the "first" or graduating class, the sergeants from the "second" class, and the corporals from the "third" class; the members of the lowest class, that is, the cadets of the first year at the academy, constitute the "fourth" class. An army officer is usually assigned to each of the four companies. He is its instructor in tactics, and is generally a lieutenant of the line. These four instructors aid the "commandant of cadets" in the work of everything pertaining to the infantry arm as well as in the discipline, with its multifarious details. Beside these, two other instructors report to and aid the commandant; one in artillery and the other in cavalry exercises.

The social relationship of cadets with each other is about the same as in colleges, where the pupils are of corresponding age. There are occasionally class separations, personal difficulties, and ostracisms more or less extended. However, there is in the cadet corps a remarkable unwritten law, which passes from generation to generation of cadets, a sort of *esprit de corps*, which demands a fearless truthfulness and generally high notions of personal honor. This *esprit* materially assists in giving character to the institution and a peculiar gentility to its graduates. It is really worth more than the boasted system of espionage which is deeply rooted in the very foundations of the West Point system.

In June, July, and August of each year the new second class has leave of absence for two and a half months. It is the only furlough during the course. The other classes are placed in an encampment during this furlough period. Only practical military work is then done. The academic studies are renewed on return to barracks, September 1.

Over the academy and all its appurtenances, and over all detachments and officers of the army stationed within the government limits, and all residents, including adults and children, is placed a superintendent. Formerly he was an officer selected from the engineers, of as high rank as practicable. Now the selection is made from the army at large, and if his rank be below a colonelcy he has the local rank of colonel while on that duty. The academic staff is made up of the professors, 7 in number, and about 30 assistants. The latter are officers of the army, selected for their proficiency in the subjects which they teach. What is called the academic board is composed of the professors, the commandant of cadets, who has the local rank of lieutenant-colonel, the senior officer of engineers on duty with the engineer company, and the senior officer of ordnance, who commands the ordnance detachment. The superintendent is, *ex-officio*, the president of the board. The duties of this board mainly correspond to those of the ordinary board of directors of other institutions. They do not, however, have much independent power. This power is for the most part exercised in the way of preparation, recommendation, and advice for the final action of the secretary of war. Such powers as they do have are fixed by law and regulations, and, whether individually or collectively considered, the members of the board are always under the command of the superintendent. The military staff of the superintendent consists of a surgeon and an assistant surgeon, an army officer detailed as treasurer, who is usually quartermaster and commissary of the cadets, also a commissioned officer as post commissary, another as post quartermaster, and still another as adjutant of the military academy.

Discipline.—Two things affect the discipline of the U. S. Military Academy and make it unusually stringent. One is the minute schedule of offences, containing more than 300 items, and the other the abundant machinery for the execution of the prescribed punishments. The cadet regulations divide the offences, beginning with the lightest, into four classes—67 in the first, 78 in the second, 94 in the third, and 65 in the fourth. Part of the penalties attached to these offences are demerit marks—1, 2, 3, and 4 or 5, classified according to the aggravation of the offence, while further penalties frequently accompany the demerit marks. They are classified:

1. Privation of recreation, extra duty (not guard), reprimands, arrest, confinement to room or tent simply, or close confinement on honor, confinement in light prison; for officers and non-commissioned officers reduction to ranks. 2. Confinement in dark prison. 3. Suspension, dismissal with the privilege of resigning, and public dismissal without such privilege. The offences called "delinquencies" are publicly read from a book of record, usually by the cadet adjutant, to the battalion of cadets. Explanations for each offence in writing are required and must be submitted to the commandant within a brief specified time. Each cadet is given on the books, at the beginning of each six months, 100 merit marks; if he cancel these by an equal number of demerit marks, prior to the termination of that period, he will be reported deficient in discipline and loses his place at the academy.

The drills and recitations, thoroughly arranged, follow each other in quick succession, the notice being given by a drum or bugle. It is believed that the cadet, by being relieved from anxiety as to his financial matters, clothing, food, and the usual cares that accompany student life, is thus enabled to do more in a given time than students elsewhere. His room, with furniture prescribed, and that in Spartan simplicity, is shared with a comrade. A cadet makes his own bed, cares for his own shelves, and for every article, shoes or clothing, within his own alcove. His room-mate takes turns with him in responsibility for all that they hold in common.

There is but one half-holiday per week, Saturday afternoon. Of late years Saturday evening till 9.30 has been allowed to such cadets as choose to visit their friends. This arrangement almost necessitates some study on the Sabbath day, still many conscientious cadets so manage as to avoid it. They have a fair gymnasium, but habitually take but little recreation, except that found in their constantly varying employment. During the summer, however, dancing and other amusements are frequent, being encouraged by the authorities. It is the time when the relations and friends of the cadets usually visit them. The daily routine is as follows:

Reveille (from May to August)	5 A. M.
Reveille (April and September)	5.30 "
Reveille (from October to March)	6 "
Breakfast	7 "
Recitations	8 A. M. to 1 P. M.
Dinner	1 to 2 "
Recitations	2 to 4 "
Military drill	4 to 5 "
Retreat and supper	Sunset.

Call to quarters	30 minutes later.
Tattoo	9.30 P. M.
Taps (lights out)	10 "

The above arrangement is varied for camp or by special orders. The cadets are required on Sunday to attend one religious service.

Course of Study, 1st year: Practical instruction in infantry tactics, police, and discipline; practical instruction in artillery tactics; instruction in small-arms (fencing, making the cuts, and target-practice); algebra, geometry, trigonometry, and descriptive geometry constitute the mathematical part; English grammar, English composition, geography, map-drawing, and lessons in French.

2d year: Practical instruction in infantry, artillery, and cavalry tactics with police and discipline; the remainder of the course in pure mathematics and in French; Spanish and certain English studies, including drawing.

3d year: The theoretical and practical teaching in infantry, cavalry, and artillery tactics, with police and discipline; natural and experimental philosophy, chemistry, with experiments; completion of course in drawing; practical out-door teaching in engineering; theoretical and practical instruction in signalling and telegraphy.

4th year: Practical instruction in infantry, cavalry, and artillery tactics; military and civil engineering and the science of war; theoretical and practical instruction in ordnance and gunnery; practical military engineering; mineralogy and geology; signalling and telegraphy; ethics; law (constitutional, international, and military).

The above gives substantially the studies of the course. It has been varied somewhat by the action of the academic board from time to time. A few lectures are given by certain professors, and the drawing of mathematical and engineering problems is required. The course is intended to lay good foundations for the practical work of an army officer, or for future scientific research.

The general examinations are held in January and June, but a careful daily examination and record kept on a merit-roll is conducted by each professor or instructor. He determines the relative merits of members of his class ("section") by marking for each recitation on a scale of tenths, 3 being the maximum mark and 0 denoting a complete failure. This record, crowned by the examination, which is very searching, determines a cadet's standing on the roll of proficiency, or proclaims him deficient. The records of the academy show that less than 50 per cent. of the admitted ever finish the course. The cadet who succeeds in passing the examinations in a manner satisfactory to the academic board graduates. The *first five* on the roll have special distinction. They are usually recommended for all branches of the army, but now generally select the engineer corps. A selected number next to these *five* on the roll are recommended for all parts of the army except the engineers; these usually choose the artillery. The remainder, being recommended for the cavalry and infantry, take choice in the order of class-rank.

The general of the army is at present the inspector of the military academy. Besides his supervision its workings are yearly scrutinized by a board of visitors. Each House of Congress sends its representative, and the President fills the board by a selection of seven other men, distinguished for their interest in the institution or in education. It should be remarked that post-graduate schools have been opened—at Fortress Monroe, for the artillery; at Fort Leavenworth, for the infantry and cavalry; and at Willet's Point, for the engineers. These are intended to superadd a special professional training for the graduates of the military academy, and also to give the needed opportunities to those who have received their commissions from civil life or from the ranks of the army.

The School at Fortress Monroe, Va., was commenced in 1867. It has a two years' course. It was intended for subalterns of artillery, yet officers of other arms of the service have, by special permission of the secretary of war, been educated there. The instruction is not confined to artillery, but takes in other studies, such as drawing, topography, military history, and whatever has a bearing upon the duties which artillery officers may be called upon to perform.

The Infantry and Cavalry School at Fort Leavenworth, Kan., began in 1882. It was designed to supply a want, long felt in the army, for more thorough professional instruction than the generality of officers received prior to receiving their commissions. Even West Point graduates, who are recognized as well instructed, gladly avail themselves of the opportunity of a wholesome review and of further prosecution of their professional studies.

The Engineer School at Willet's Point was established by a small beginning in 1865. This institution is especially scientific and practical. It carries its investigations into every branch of military engineering. It has given especial attention to permanent works, their construction and management. In the face of modern inventions it has kept pace with the age in the line of explosives, torpedoes, and other harbor defences. The course is for two years, and the instruction is confined to engineer and artillery officers. The latter are detailed for six months, one from each regiment; their course comprises torpedoes and electricity.

Other Military Colleges and Schools.—Among the most notable military schools in the United States is the *Virginia Military Institute.* It ranks next to that at West Point. It owns property the value of which exceeds $500,000, and is now partly supported by the State of Virginia. This school is located at Lexington, Va., and was founded in the year 1839. In 1884 it had 143 students, with 8 professors. Its general plan, including instruction and discipline, appears to be modelled after the U. S. Military Academy. In fact, such is the case with every distinctively military school in the Union. The *Kentucky Military Institute* began its existence in 1846, at Frankfort. It has often had between 200 and 300 students. It is now located at Farmdale, and in 1884 had 128 students, with 11 professors and instructors. There are numbers of military schools privately sustained, but more especially in the Southern States. In the North, Massachusetts, Vermont, New York, Michigan, Minnesota, Ohio, and Pennsylvania furnish good samples of them.

Since the war of the rebellion it has been the policy of the general government to diffuse military knowledge among the youth who receive a higher education. To facilitate this, Congress, by act of July 28, 1866, authorized the detail of 30 commissioned officers of the army to act as professors of military science and tactics at *certain designated colleges.* These were the colleges which had accepted from the United States certain grants of land for educational purposes. It had been stipulated in the grants, and made obligatory upon each college so helped, to embrace military training in its course of instruction. The colleges excused themselves for a failure to comply with the required conditions on the ground that they could not procure the necessary instructors. That they should no longer have any excuse for this evident neglect the detail of competent officers from the army was authorized. Later, in 1883, the number so detailed was increased to 40. They are distributed among the different States as nearly as possible according to the population. Recently *State institutions* which will introduce a military branch are preferred, evidently upon the principle of bringing the greatest good to the greatest number.

At an institution of this kind the officer is furnished the essential material for his department, and is reasonably well sustained by the faculty in his efforts at military discipline. The obstacles here in the way of an efficient management of a military department in a civil institution are evident, because the exercise of authority must depend mostly upon "moral suasion." It requires great tact, a careful fostering of an *esprit de corps*, and a marked independency of character on the part of the military instructor, to approximate anything like satisfactory results.

On account of a natural reaction naturally setting in against military government after a great war, the results of military schools and attachments such as named have not reached the hoped-for standard; still, there is a steady improvement, and the wholesome "leaven" of good order, good government, obedience, and military knowledge are felt throughout the State where such an institution is situated. (O. O. H.)

MILITARY LAW. See Articles of War.

MILITIA. See State Militia.

MILK. See Dairy Products.

MILL. See Flour.

MILLAIS, John Everett, an English painter, was born at Southampton, June 8, 1829. His childhood was spent in France and among the Channel Islands. When only nine years old he received a medal from the Society of Arts, and in 1840 he entered the antique school of the Royal Academy. In 1846 he exhibited his first picture, Pizarro Seizing the Inca of Peru, and in 1847 won the gold medal by his painting The Tribe of Benjamin Seizing The Daughters of Shiloh. Thus far he had followed the ordinary academic rules of art, but in 1849 he joined with W. Holman Hunt and Dante G. Rossetti in casting off the trammels of their training and determining to paint nature as it really appeared. The new school called itself the Pre-Raphaelite Brotherhood, though there was but little reason for the appellation. Ruskin aided the movement by his investigation of the principles of art in his *Modern Painters*, but its principles were set forth more directly in a little periodical called *The Germ.* Millais' first picture after adopting these views was Isabella, taken from Keats's poem, but his The Child Jesus in the Workshop of Joseph (1850) became the subject of artistic controversy. The studied simplicity and painful realism of this and other works caused critics for a time to deny them any beauty, but their power steadily asserted itself, and overcame the ridicule which attempted to drive them from the field. The Huguenot Lovers (1852) was a marked success, and in 1853 Millais was admitted as associate of the Royal Academy, sending to its exhibition The Proscribed Royalist. In 1864 he was made a member of the academy. Though he still continues to produce noteworthy paintings, his original peculiarities are not so marked in his later works as in those of earlier date. He has become the leading portrait-painter in England. His landscapes, too, are remarkable for their truthfulness and natural beauty. Among his later works of this class are The Fringe of the Moor (1875), Over the Hills and Far Away (1876). Many of his other works are well known through engravings. He has himself made many illustrations for books and periodicals.

MILLEDGE, John (1757–1818), an American soldier and statesman, was born at Savannah, Ga., in 1757. He took part in the Revolutionary war, capturing Gov. Wright in 1775, and assisting at the sieges of Savannah and Augusta in 1779. He was appointed State attorney-general in 1780, and was frequently a member of the legislature. He was a member of Congress from 1792 to 1802, then governor of the State until 1806, and afterward U. S. Senator until 1809. He was the chief founder of the University of Georgia. He died near Augusta, Ga., Feb. 9, 1818.

MILLER, Joaquin, an American poet and prose writer, was born near the Wabash in Indiana, Nov. 10, 1841, his name being properly Cincinnatus Heine Miller. In 1852 his parents removed to Oregon, and the son, a few years later, became a miner and adventurer in California. He served with the filibuster Walker in Nicaragua, and afterwards lived with the Indians. Abandoning his wild life in 1860 he returned to Oregon and began to study law. In 1861 he undertook to edit a Democratic paper at Eugene City, but it was suppressed for disloyalty. In 1863 he married, after three days' acquaintance, Minnie Theresa Dyer, a writer of graceful verses who had contributed to his paper under the name "Minnie Myrtle" She obtained a divorce from him in 1871 on the ground of desertion. He had been from 1866 judge of a county court and then began to publish poems, though he had composed many in his boyhood. From the title of one of his collections *Joaquin et al.* he derived the name by which he has since been known. In 1870 he had gone to London, where he published *Songs of the Sierras* (1871); *Songs of the Sun Lands* (1872); and a prose narrative, *Life among the Modocs* (1873). His vigorous and passionate descriptions of his lawless and adventurous life won him favor among English critics in despite of his many faults in diction and manner. He became a frequent contributor to periodicals. In 1880 he returned to the United States, where he has since been a journalist.

MILLER, William Hallowes (1801–1880), an English mineralogist, was born at Llandovery, Carmarthenshire, April 6, 1801. He was educated at the University of Cambridge in 1826 and became fellow and tutor in St. John's College. He was made professor of mineralogy in 1832, and in 1843 was a member of the royal commission appointed to superintend the construction of standards of length and weight in place of those destroyed in the burning of the Parliament House in 1834. This work was completed in 1854, and Prof. Miller was subsequently employed on commissions on the exchequer standards and on the metric system. He published many important papers on mineralogy and crystallography. He died at Cambridge, May 20, 1880.

MILLS, Clark (1815–1883), an American sculptor, was born in Onondaga co., N. Y., Dec. 1, 1815. Being left an orphan, he learned the trade of a millwright, and afterwards of a plasterer, following the latter at Charleston, S. C., for nine years. Without instruction in art he showed a taste for sculpture and modelled busts in clay. In 1846 he made a marble bust of John C. Calhoun, which was purchased for the City Hall of Charleston. Going then to Washington he was commissioned by Congress to make an equestrian statue of Jackson from cannon captured by that hero. He made a full-sized model in plaster, so balanced that it rested on the horse's hind feet alone. He then undertook to build a foundry in which the statue might be cast. After various delays and accidents the work was accomplished and the statue unveiled on Jan. 8, 1853. It stands in Lafayette Square, Washington, and there is a duplicate at New Orleans. Mills was next commissioned to prepare a colossal equestrian statue of Washington, and this was inaugurated at Washington, Feb. 22, 1860. In 1863 he cast in bronze Crawford's colossal statue of Liberty, which now crowns the dome of the Capitol at Washington. He died at Washington, Jan. 12, 1883.

MILLS, Samuel John (1783–1818), an American clergyman, was born at Torringford, Conn., April 21, 1783, the son of a clergyman. Having entered Williams College in 1806 he induced some of his fellow-students in 1808 to form a foreign missionary society, the first proposed in America. After graduating in 1809 he studied theology at Yale College and subsequently at Andover, still urging his missionary schemes. In 1810, in company with Adoniram Judson (for whom see Encyclopædia Britannica) and others he presented a memorial to the General Association of Massachusetts which led to the formation of the American Board of Commissioners of Foreign Missions. Mills was licensed to preach in 1812 and ordained in 1815. He was engaged as a home missionary in the Southern States and afterwards in New York city. He took part in forming the American Bible Society and the American Colonization Society. By the latter he was sent to Africa to choose a site for a colony, and he selected Liberia (*q. v.*). He was returning to America when he died at sea, June 16, 1818. His *Memoir* was published by Rev. Gardiner Spring (1820).

MILMORE, Martin, (1845–1883), an American sculptor, was born at Boston in 1845. In 1860 he began to study art under Thomas Ball, and in 1863 he sent to the Sanitary Fair a statuette. He studied for some time at Rome, where he made busts of Sumner, Emerson, Pius IX., and others. He also made granite statues of Ceres, Flora and Pomona for Boston Horticultural Hall, the Soldiers' Monument on Boston Common, and another at Forest Hill Cemetery, Roxbury, Mass. He died at Boston, July 21, 1883.

MILNE-EDWARDS, Henri, a French naturalist, was born at Bruges, Belgium, Oct. 23, 1800. He studied medicine at Paris, and graduated in 1823. He devoted himself to natural history, becoming professor thereof at the Lycée Henri IV., and afterwards at the Museum. In 1862 he succeeded Geoffroy St. Hilaire as professor of zoölogy, which position he held till 1876. In 1838 he had been admitted to the Academy of Sciences as the successor of Cuviér. Among his works are *Récherches anatomiques sur les crustacés* (1828); *Cours élémentaire de Zoölogie* (1851); *Leçons sur la physiologie et l'anatomie comparée* (11 vols., 1851–76); *Recherches pour servir à l'histoire naturelle des mammifères* (2 vols, 1868–74).

His son, Alphonse Milne-Edwards, born in 1835, received his degree as doctor of medicine in 1859, and became professor at the School of Pharmacy in 1865. He succeeded his father as professor of zoölogy at the Museum in 1876. Among his published works are *Recherches sur la famille des chevrotains* (1864); *Histoire des crustacés podophthalmaires fossiles* (1865); *Recherches sur l'histoire des oiseaux fossiles de la France* (1866–72).

MILWAUKEE, the largest city of Wisconsin, county-seat of Milwaukee county, is on the W. shore of Lake Michigan, 80 miles N. of Chicago, and in 43° 4′ N. lat., 87° 57′ W. long. It is pleasantly situated at the mouth of the Milwaukee River, which is here joined by the Menononee and Kinnikinnic. The rivers have been converted by artificial means into a commodious harbor. The town is regularly and handsomely planned, its situation presenting many advantages as a town-site. The principal streets are wide and densely shaded with trees, and many of the residences are surrounded by spacious lawns. The facilities for drainage are excellent and the sanitary condition of the city is good. The extensive use of cream-colored brick as a building material gives the town a unique appearance. Milwaukee is the principal centre of four great railway systems—the Chicago, Milwaukee and St. Paul, the Milwaukee and Northern, the Wisconsin Central, and the Milwaukee, Lake Shore, and Western. These roads and their branches, together with the Chicago and Northwestern Railway, give the city very complete connections with all points in the Upper Lake and Northwestern regions of the country. Milwaukee is a port of entry. Among the principal buildings are the courthouse, Mitchell's bank, the chamber of commerce, the North-western Life Insurance building, the railway stations, the Plankinton hotel, St. Paul's church, the Republican house, the exposition building, the armory, the normal school, the public library, and the town-hall. The city has many handsome business buildings, extensive grain-elevators, foundries, iron-mills, and many industrial establishments of importance. The public school-houses are 28 in number, all large and commodious. There are 87 churches (several of them fine structures), several large theatres, an opera-house, an academy of music, 10 banks (3 of them national), and 6 daily and 10 weekly newspapers. The manufacturing interests are large and of increasing importance. There are large rolling-mills and woollen-factories, extensive flouring-mills, 7 great breweries (the product of which is very widely distributed), pork-packing establishments, and many brick-yards, producing the well-known pale bricks which give to the town its name of "the Cream City." Near the town are extensive stockyards. Among the leading articles manufactured are leather, furniture, farming implements, etc. The wholesale trade is large. The city is lighted with gas and electricity, has a public water supply, and efficient fire and police departments. The tax valuation is $80,000,000; the public debt, $2,566,000. The settlement of Milwaukee as a town dates from 1835. It was incorporated as a city in 1846. The German, Polish, and Scandinavian element in the population is large. The city is the seat of a Roman Catholic archbishop. Very near the city limits stands a national home for disabled volunteer soldiers. The population of Milwaukee in 1870 was 71,440; in 1880, 115,578.

MINGHETTI, Marco, an Italian statesman, was born at Bologna, Sept. 8, 1818. After receiving a good education he travelled in France, England, and Germany. On his return in 1846 he was an earnest advocate of free-trade. He established a newspaper and lectured on agriculture and political economy. In 1847 he was called to Rome to assist in the financial administration, and in March, 1848, became minister of public works, but resigned seven weeks later when Pope Pius IX. retracted his liberal policy. He then entered the Sardinian camp in Lombardy, and served with distinction on the staff of Charles Albert. He was called to Rome to take a place in Rossi's cabinet, and arrived on the day of the assassination of that minister. Refusing to accept the position left vacant Minghetti returned to Bologna and devoted himself to scientific and literary labors. In 1858 he travelled in Egypt, intending to go farther east, but returned on account of the critical condition of affairs in Italy. Minghetti had given much assistance to Cavour in his policy for the unification of Italy, and was now called by him to be secretary-general of foreign affairs. Here he helped to secure the annexation of the Italian duchies and the Romagna. He was elected member of the Italian parliament from the latter district. In 1860 he became minister of the interior, and retained this post for a time after the death of Cavour. In 1863 he was made president of the council and minister of finance, and exerted himself to secure equality of imports throughout the kingdom. In 1868 he retired from the cabinet and was made ambassador to London. In May, 1869, he entered the ministry under Menabrea, taking the department of agriculture, but this ministry lasted only six months. In July, 1873, Minghetti was again made president of the council, and in spite of the financial difficulties maintained his position until March, 1876. Among his published works are *Della economia publica e delle sue attinenze con la morale et col diritto* (1857); *Le Donne italiane nelle belle arti al secolo XV. et XVI.* (1877); *La Chiesa et lo stato* (1878).

MINIE, Claude Étienne (1804–1879), a French army officer and inventor, was born at Paris, Feb. 13, 1804. He entered the army as a private in 1821, and became a captain in 1845. He was wounded in Algeria, and afterwards taught gunnery at the school of Vincennes. In 1849 he invented the rifle-ball which bears his name, but took no patent for it. This rifle was first used with effect by the English at the battle of Inkermann, and was not employed in the French army till after the Crimean war. In 1852 Capt. Minie was made chief of battalion, but resigned in 1857. He came to America in 1869 to take charge of the Remington gun-factory, and afterwards had charge for a time of a manufactory of arms and a school of gunnery at Cairo, Egypt. He died suddenly at Paris, Dec. 14, 1879.

See Vol. XVI. p. 459 Am. ed. (p. 440 Edin. ed.).

MINING. American mining has been characterized like other industrial pursuits by a ready adaptation to exceptional circumstances. The means chosen to attain the ends in view have not always been well selected, though it would be unfair to apply to them the standard of European methods. The wealth of boundless resources in virgin ground, and the desire for quick returns have notably in the earlier days led to a lavish waste which has only too often justified the criticism that the deposits were robbed, that they were not worked in accordance with a far-sighted system calcu-

Mineral Production of the United States.

Table I.—Metallic Products.

	Quantities.			Values.			
	1882.	1883.	1884.	Where valued.	1882.	1883.	1884.
Pig-iron ....Long tons.	4,623,323	4,595,510	4,097,868	Furnace.....	$106,336,429	$91,910,200	$73,761,624
Silver............Troy oz....	36,197,695	35,733,622	37,744,605	Coining	46,800,000	46,200,000	48,800,000
Gold.............Troy oz....	1,572,186	1,451,249	1,489,949	Coining	32,500,000	30,000,000	30,800,000
Copper ....Pounds....	91,646,232	117,151,795	145,221,934	New York..	16,038,091	18,064,807	17,789,687
Lead..............S. tons.....	132,890	143,957	139,897	New York..	12,624,550	12,322,719	10,537,042
Zinc ....S. tons.....	33,765	36,872	38,544	New York..	3,646,620	3,311,106	3,422,707
Quicksilver.. .Flasks	52,732	46,725	31,913	San Fran...	1,487,042	1,253,632	936,327
Nickel...........Pounds	281,616	58,800	64,550	Phila.........	309,777	52,920	48,412
Antimony ......S. tons.....	60	....	....	Phila.........	12,000		
Platinum ......Troy oz....	200	200	150	New York..	600	600	450
Aluminium....Troy oz....	....	1,000	1,800	Phila.........	....	875	1,350
Total values of metallic products..					$219,755,109	$203,116,859	$186,097,599

Table II.—Non-Metallic Products.

	Quantities.			Values.		
	1882.	1883.	1884.	1882.	1883.	1884.
Bituminous coal, brown coal, lignite..................Long tons..	60,861,190	68,531,500	73,730,539	$76,076,487	$82,237,800	$77,417,066
Penna. anthracite............Long tons..	31,358,264	34,336,469	33,175,756	70,556,094	77,257,055	66,351,512
Petroleum.......................Barrels......	30,053,500	23,400,229	24,089,758	23,704,698	25,740,252	20,476,294
Lime...............................Barrels......	31,000,000	32,000,000	37,000,000	21,700,000	19,200,000	18,500,000
Building stone..	....	....	....	21,000,000	20,000,000	19,000,000
Salt.................................Barrels......	6,412,373	6,192,231	6,514,937	4,340,140	4,211,042	4,197,734
Cement ....Barrels......	3,250,000	4,190,000	4,000,000	3,672,750	4,293,500	3,720,000
Limestone for iron flux.....Long tons..	3,850,000	3,814,373	3,401,930	2,310,000	1,907,136	1,700,965
South Carolina phosphate.Long tons..	332,077	378,380	431,779	1,992,462	2,270,280	2,374,784
Mineral waters.................Gallons	....	47,289,743	68,720,936	....	1,139,483	1,665,490
New Jersey marls............Short tons..	1,080,000	972,000	875,000	540,000	486,000	437,500
Concentrated borax.........Pounds......	4,236,291	6,500,000	7,000,000	338,903	585,000	490,000
Mica................................Pounds......	100,000	114,000	147,410	250,000	285,000	368,525
Natural gas...	....	....	....	215,000	475,000	1,460,000
Ochre..............................Long tons..	7,000	7,000	7,000	105,000	84,000	84,000
Soapstone ....Short tons..	6,000	....	....	90,000		
Crude barytes..................Long tons..	20,000	27,000	25,000	80,000	108,000	100,000
Precious stones..	....	....	....	75,000	115,000	140,000
Gold quartz souvenirs.....................................	....	....	....	75,000	92,050	82,975
Pyrites ....Long tons..	12,000	25,000	35,000	72,000	137,500	175,000
Manganese ore...............Long tons..	3,500	8,000	10,000	52,500	120,000	120,000
Asbestos..........................Short tons..	1,200	1,000	1,000	36,000	30,000	30,000
Graphite ....Pounds......	425,000	575,000	....	34,000	46,000	
Cobalt oxide....................Pounds......	11,653	1,096	2,000	32,046	2,795	5,100
Zinc, white......................Short tons..	....	....	13,000	....	....	910,000
Slate ground as pigment...Long tons..	2,000	2,000	2,000	24,000	24,000	20,000
Sulphur...........................Short tons..	600	1,000	500	21,000	27,000	12,000
Asphaltum ....Short tons..	3,000	3,000	3,000	10,500	10,500	10,500
Corundum ....Short tons..	500	....	....	6,250		
Pumice-stone...................Short tons..	70	....	....	1,750		
Bromine...........................Pounds......	....	301,100	281,100	....	72,264	67,464
Felspar............................Long tons..	....	14,100	10,900	....	71,112	55,112
Chrome iron ore..	....	....	....	50,000	60,000	35,000
Total values of non-metallic products..				$227,461,580	$241,087,769	$220,007,021

Table III.—Resumé of Values of Mining Products.

	1882.	1883.	1884.
Metals..	$219,755,109	$203,116,859	$186,097,599
Mineral substances, enumerated...	227,461,580	241,087,769	220,007,021
Mineral substances, not specified..	8,000,000	8,000,000	7,000,000
Grand total..	$455,216,689	$452,204,628	$413,104,620

lated to reach the highest results from an economical point of view. It is not denied that there has been only too often either total ignorance of or calm disregard of the teachings of centuries of practice abroad, leading to costly and disastrous failures. On the other hand, the fact that Americans approached the solution of problems before them unfettered by tradition and prejudice has done much toward developing an originality which has led to exceptionally favorable results. Mining has been conducted often in inaccessible localities, where labor, fuel, and supplies commanded exceptionally high prices. This has barred the utilization of lower grades of ore, or smaller deposits, and has thus intensified the fluctuations in the fortunes of individual enterprises and entire districts, because the world over large bodies of ore and accumulations of rich ore are the exception. The industry becomes more permanent and more regular the more it can be made to rest upon the basis of a lower grade of material. The tendency toward venturing much for exceptionally large and quick returns has been stimulated often by the fact that mining operations have been made the pretext for stock gambling on a large scale, and thus bold projects and great feats have found encouragement. High prices for labor have stimulated the substitution of machinery for hand labor, and have carried the mechanical appliances used in mining and in the subsequent processes of extraction to a high degree of perfection. This and improved means of transportation have again reacted upon mining in enlarging the narrow limits within which formerly profitable working was confined. This, the first period in the development of mining in the United States, may now be stated to have fairly passed by. No inconsiderable percentage of our originally vast mineral resources has thus been irretrievably wasted, and the experience obtained has been dearly bought. But, however disastrous in some respects this period may have been, it has been brilliant in remarkable achievements.

In the search for ore deposits Americans have availed themselves to a greater extent than any other miners of the diamond drill. (See illustration in COAL, Vol. II., p. 238.) Cleverly adapted to the necessities of the case, the machines are lightly built and readily transportable even in a new country. They are almost exclusively used now in the iron-mining region of Lake Superior. For underground prospecting the diamond drill was first employed on a very extensive scale in the Silver Islet mine, Lake Superior. In mine work proper, progress has been greatly aided by the experience obtained in railroad tunnels. It was there that power-drills and high explosives were first proved to be highly efficient, and the modern practice in this country is abreast of, if not superior to, that abroad. In the depth of our mines we have not yet reached the records of some of the workings, centuries old, on the continent of Europe and in Great Britain; although, considering the adverse circumstances against which they must battle, the deep mines of the Comstock lode stand unparalleled; the heat in the lower workings generally exceeding 100° Fahr. Pumping machinery has been brought to a high degree of perfection, and in the hydraulic pumps first put up on the Comstock lode, and later at the Eureka mine, Nevada, a new departure has been taken which has been followed with success in Scotch collieries. For hoisting, single-acting drums, with gear by friction clutches, have been largely adopted, the most highly-developed types being those recently adopted by the Calumet and Hecla mine, on Lake Superior, and in the anthracite coal regions. For underground haulage, locomotives and cable traction have come into use largely, allowing of the rapid and cheap handling of large quantities of material. Of late years the concentration of ores by the separation of the waste rock from its valuable contents has made considerable progress, though it has not been developed to that high state of efficiency attained in some parts of Europe. In some instances, as in the machines of which the True rammer is the leading example, American ingenuity has opened out lines of its own, and the rock-crushers invented by Blake have been accepted, with slight modifications, as the most suitable for its purpose the world over. American stamp-mills for crushing silver and gold ores are models requiring a minimum of labor and fuel for maximum work, while in the Lake Superior copper district the Ball and Leavitt direct-acting steam-stamps have reached a high capacity by a slow but steady course of improvement. Our characteristically American method of mining is the hydraulic gold mining by which the auriferous gravels of California are made to yield their treasure. On the whole, American methods have been made to conform well to the exigencies which they are intended to meet. Without sacrificing originality, practice abroad is now closely watched, and improvements, modified if necessary, are promptly adopted.

The statistics of the mining industry of the United States cannot be segregated from those relating to the production of the metals. Thus, the Division of Mining Statistics of the U. S. Geological Survey has not attempted to gather the figures of the production of the ores from which pig-iron, silver, gold, copper, zinc, lead, quicksilver, nickel, aluminium, and platinum are obtained. The product of the mines is grouped under metallic and non-metallic mineral products, the three tables on page 733 giving the quantities and the values for recent years, as reported by the U. S. survey.

The figures published in the U. S. census reports of 1880 have been seriously impeached so far as the production of gold is concerned. They furthermore, on the output of lead ore, assume that the yield of the mines in the Rocky Mountains should not properly be classified under that metal, because it included precious metals. The figures given, therefore, cover only the data relating to the mines east of the 100th meridian. Similarly the Western copper product is ruled out on the ground that "copper mining in Arizona, California, etc., results not in the production of copper alone, but in that of *copper matte*, a mixture of copper and other metals, which is sold in the East to be refined." This is incorrect, because the output of the Arizona mines was at that time exclusively bars, carrying about 96 per cent. of copper, and the bulk of the California make was precipitate ranging from 75 to 85 per cent. of metal. With these reservations the census figures are given below, since they afford the only data available on the number of men employed, the wages, and the capital invested. Practically, they do not include the entire mining industry of the Rocky Mountains.

TABLE IV.—CENSUS REPORT OF MINING IN THE UNITED STATES IN 1880.

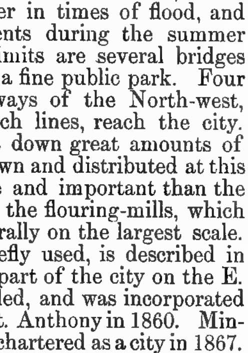
Minerals.	Production, net tons.	Value of product.	Capital invested.	Wages paid annually.	Men employed.	Boys employed.	Total hands employed.
Bituminous coal	41,860,055	$52,427,868	$103,109,807	$32,601,460	93,957	6,159	100,116
Anthracite coal	28,621,371	42,139,740	154,504,336	22,693,407	54,616	16,132	70,748
Iron ore	7,064,829	20,470,756	61,782,287	9,538,117	30,080	1,588	31,668
Copper ore	1,007,245	8,886,295	31,807,596	3,214,031	5,966	292	6,258
Lead and zinc	177,008	4,182,685	7,442,983	2,640,265	7,323	160	7,483
Minor minerals	....	3,387,444	6,262,315	1,305,222	4,026	176	4,202
Total	....	$131,494,788	$364,909,324	$71,992,502	195,968	24,507	220,475

(C. K.)

MINNEAPOLIS, the largest city of Minnesota, seat of justice of Hennepin county, is pleasantly situated on both sides of the Mississippi River at the Falls of St. Anthony, 10 miles W. by N. of St. Paul, with which city it is closely connected by business interests, and with which, by the steady growth of both places, it is likely to become united into one great metropolis. Minneapolis is in 44° 58′ N. lat., 98° 18′ W. long. It is the seat of the University of Minnesota, a thriving State institution, open to youth of either sex, and of the Augsburg Theological Seminary (Lutheran). It has commodious city and county buildings, a high-school, a large U. S. post-office building, and an excellent system of graded public schools, and is well supplied with churches, banks, hotels, and theatres, many of them occupying structures of noteworthy excellence. The daily and weekly newspapers are numerous, enterprising, and generally well conducted. Several are printed in the Scandinavian language and in the German. The city is handsomely planned, with wide and straight streets and avenues. The city is well sewered, and has water supply, street railways, and electric lights. The Falls of St. Anthony afford ample water-power, which has greatly promoted the growth of the city; but the rapid erosion of the sandstone and limestone under the falls having seriously threatened the permanency of this power, extensive engineering works have been constructed, which have thus far averted the threatened danger. The water-power has also been rendered more permanent by the construction of a series of reservoirs on the upper tributaries of the river, which retain a large volume of water in times of flood, and which discharge their contents during the summer droughts. Within the city limits are several bridges across the river, and there is a fine public park. Four of the principal trunk railways of the North-west, with various local and branch lines, reach the city. The upper Mississippi brings down great amounts of logs and timber, which are sawn and distributed at this point. Even more extensive and important than the lumber-mills of the town are the flouring-mills, which are very numerous and generally on the largest scale. The roller process, here chiefly used, is described in the article on FLOUR. That part of the city on the E. of the river was the first settled, and was incorporated as a city under the name of St. Anthony in 1860. Minneapolis, on the W. side, was chartered as a city in 1867. St. Anthony was merged in the city of Minneapolis in 1872. The population in 1880 was 46,887, and has since greatly increased.

See Vol. XVI. p. 497 Am. ed. (p. 475 Edin. ed.).

MINNESOTA. The name of this State is an Indian word signifying "sky-tinted water." It was taken from the river of the name, and given the new Territory in preference to Itasca, the name at first proposed. The Territory of Minnesota was organized by act of Congress on March 3, 1849, and was admitted into the Union on Feb. 26, 1857, as the twentieth State, exclusive of the original thirteen, and the eleventh of the public land States. It is thirteenth in area among the States, being about the size of Kansas, Idaho, and Utah, and nearly double the size of the State of Ohio. In 1884 it ranked fourth among the States in the production of wheat and of barley, sixth in hay, and eighth in oats.


L'ETOILE DU NORD.

Agriculture.—The State is chiefly devoted to agriculture. It lies N. of the great corn-belt of the country, and it was thought by the early settlers that the climate was too severe and the growing season too brief for successful corn-raising. Later observations have dispelled this notion, and the State now produces large quantities of corn, oats, potatoes, etc. In 1884 the production of oats was nearly equal that of wheat, and that of corn about one-half. The soil is adapted to the culture of all cereals, but the climate interferes seriously with success in many. Wheat has long been the staple product of agriculture. The number of acres in farms in 1884 was 13,403,019, and of woodland, 2,030,726. The total value of the land, without regard to condition, was $16,351,867; of the improvements, $5,396,116. The following table shows the average for nine years (1872–1880, inclusive) of the crop products of the State:

Crop.	Number of bushels.	Number of acres.	Yield per acre.	Average price per bushel.	Total value of crop.
Wheat........	26,228,608	1,851,196	14.5	$0.80	$21,178,528
Hay (*a*).......	1,121,841	757,071	(*a*) 1.41	(*a*) 5.16	5,513,469
Oats...........	13,865,250	406,728	34.2	.31	4,184,172
Corn..........	10,435,862	324,314	31.8	.38	3,741,938
Potatoes......	3,301,125	32,704	100.0	.37	1,174,041
Barley.........	1,564,237	58,912	26.4	.59	846,679
Rye............	144,475	7,617	18.9	.52	75,587
Buckwheat..	70,500	4,626	15.3	.70	46,881

(*a*) Tons.

Of the eight principal crops, the number of acres of cultivated land in 1884 was 6,210,306, and the total value of all products, $56,826,386. The acreage, yield, etc., are seen from the following exhibit;

Crop.	Bushels.	Bushels per acre.	Acres.	Price per bushel.	Total value.
Corn...........	15,124,800	20.8	727,155	$0.43	$6,503,664
Wheat.........	33,773,200	13.0	2,597,940	.80	27,018,560
Rye.............	466,867	14.8	31,440	.50	233,434
Oats............	31,447,500	33.1	949,200	.28	8,805,300
Barley.........	7,276,040	22.9	318,270	.47	3,419,739
Buckwheat..	30,360	5.3	5,772	.73	22,163
Potatoes.......	5,839,000	100.0	58,390	.27	1,576,530
Hay (*a*).......	2,054,888	(*a*) 1.35	1,522,139	(*a*)4.50	9,246,996
Total......	....	....	6,210,306	......	$56,826,386

(*a*) Tons.

A partial report of the crop for 1885 shows that there were 648,913 acres in corn, yielding 18,431,000 bushels, with a value of $5,897,920; wheat, 1,362,785 acres, 15,665,000 bushels, $11,905,400; oats, 1,076,393 acres, 37,544,000 bushels, $9,386,000; flax, 109,335 acres and 826,281 bushels of seed.

The live-stock interests of the State are important and increasing. The report for 1880 gives the number of horses at 257,282; mules and asses, 9019; working oxen, 36,344; milch-cows, 275,545; other cattle, 347,161; sheep, 267,598; swine, 381,415; the total value of all live-stock for that year, $31,904,821. The live-stock in 1884, the last year for which full accounts are to be had, is seen from the following:

Stock.	Number.	Average price.	Total value.
Horses..................	306,399	$82.00	$25,124,718
Mules....................	9,853	99.83	983,625
Milch-cows............	343,864	31.50	10,831,716
Other cattle..........	427,084	25.56	10,916,267
Sheep..................	275,463	2.66	732,732
Hogs....................	411,335	5.22	2,147,169

The total number of all cattle for that year was 770,948, of which number 92,574, or 12 per cent., were high-grade stock. The total number of cattle in 1885 was 804,393, valued at $21,663,589.

Manufactures.—The manufactures of the State are yet in their infancy. With the exception of flouring-mills and lumber manufactories, there are few of any special importance. Some manufactures of brick, pottery, stone-ware, etc., are carried on, as also of agricultural implements, furniture and other wooden goods. Meat-packing has attracted attention considerably in later years. The number of manufacturing establishments at the last enumeration was 3493, employing a capital of $31,004,811. The average number of hands employed was as follows: males over 16 years of age, 18,902; females over 15 years, 1636; children and youth, 674. The total wages paid in all establishments for that year was $8,613,194; the value of all materials used, $55,660,681; value of all products, $76,065,198.

Finances.—The net debt of the State in 1880 was $2,565,000. In 1883 the larger part of this debt matured and was liquidated, leaving the debt merely nominal at about $260,000. The debt of the counties is $915,796, of which $798,727 is bonded and $115,069 is floating; the sinking fund aggregates $12,384, leaving the net county indebtedness $901,412. The debt of the school districts is $691,472; of the municipalities having less than 7500 inhabitants, $706,797, and of those over 7500 population, $2,929,582. The assessed valuation of the State is $258,028,687, of which $203,446,781 is realty and $54,581,906 is personal property. The true valuation is $709,616,297, and the total taxation, not national, is an average of $2,648,372. The internal revenue receipts for the year 1885 were as follows: from spirits, $105,577.58; tobacco, $113,516.89; fermented liquors, $271,485.48; penalties, $1569.04; total revenue, $492,148.99. The development of the resources and values of the State can be best seen from the following table of certain years from 1861 to 1877:

Year.	Number of acres.	Value of lands and buildings.	Value of town and city property.	Value of personal property.	Total valuation.
1861..	7,120,045	$21,395,258	$11,954,799	$5,914,683	$39,264,740
1865..	8,829,844	25,713,494	8,087,238	11,383,331	45,184,063
1870..	10,536,921	46,236,193	20,985,155	19,912,325	87,133,673
1874..	13,741,404	113,410,620	58,994,793	45,021,798	217,427,211
1877..	15,310,765	118,769,222	57,014,757	45,141,659	220,925,638

Education.—The public-school system of the State is fashioned after that which prevails in all the Northern States of the Union. The income is large and economically administered, and the schools are in a flourishing condition. Sections 16 and 36 of every township are set aside for school support. The total amount of land available under this act is 2,969,990 acres. An additional grant was made under acts of Congress by which 82,640 acres more were set aside for university purposes, and still later, July 2, 1862, 120,000 acres more were set aside. The public schools are free to all resident youth of school age, from 5 to 21, without regard to color or nationality; and county boards of trustees and boards of education have power to admit pupils over 21 years of age, or who are non-residents, upon the payment of such tuition-fee as may be agreed upon. The schools are sustained from the proceeds of a State school fund, from a county tax of one mill on the dollar, from the proceeds of the liquor traffic, from the unclaimed proceeds arising from the sale of estray animals, and from an optional tax of the districts not to exceed in any one year 9 mills on the dollar. The State funds are apportioned on the basis of the enrolment of the children of school age in public schools having an annual term of not less than 3 months under a licensed teacher; and the teachers must keep the registers properly on which such apportionment is made, and return the same to the district clerk at the close of each term; otherwise, the salary for the last month of the term will be withheld. The State appropriates $3000 annually to defray the expenses of such teachers' institutes and other normal training as the State superintendent may deem necessary. The county superintendent is to have charge of all such institutes, and it is made the duty of all teachers to attend them. Women may vote and hold any office pertaining solely to the management of the public schools. Cities and villages of over 500 population, not under special law, may be organized into independent school districts, with boards of education elected by the people for a term of 3 years. The number of children enrolled in the schools in 1881–82 was 196,643, and in the graded schools, 43,800. The average daily attendance in the winter terms was 97,532, and in summer, 76,946. The number of school districts was 4637; school-houses, 4260; average time of school terms, 98 days; and the total valuation of all public school property, $3,947,857. The number of teachers in the day-schools was 4336; monthly salary of male teachers, $36.50; of females, $28.50. The entire income of the public schools was $1,988,190; the expenditure for schools, $1,993,364; and the amount of available funds, $5,295,101. In the four principal cities the school statistics were as follows: Minneapolis, 7750 enrolled, average daily attendance, 4958, number of teachers, 142, expenditure, $125,576; St. Paul, 6725 pupils, 3849 attendance, 121 teachers, $182,503 expense; Stillwater, 1247 pupils, 802 attendance, 22 teachers; Winona, 1805 pupils enrolled, 1353 in attendance, 38 teachers, $23,491 expenditure. The number of schools for higher education is seen in the following table:

Grade.	Schools.	Teachers.	Pupils.
Normal	3	34	776
Commercial and business colleges	8	12	706
Kindergarten	7	23	243
Secondary instruction	14	82	1,476
Superior instruction of women	2	21	228
Universities and colleges	5	126	981
Theology	3	9	41
Medicine	1	32	62
Deaf and dumb	1	8	116
Blind	1	11	36
Reform school	1	22	106
Orphan homes, etc	2	7	68

Transportation.—The Mississippi River is navigable from St. Paul south, and furnishes an outlet for vast quantities of lumber, flour, and such commodities as may not require speedy transit. The port of Duluth and other places on Lake Superior are accessible for immense shipping to the seaboard by way of the lakes. The State is liberally supplied with railroads. There are now 9 distinct systems of roads, with branch lines aggregating 33 roads. The number of miles of rail in the State in recent years is as follows: in 1865, 213 miles; in 1870, 1092; in 1875, 1990; in 1877, 2194; in 1878, 2535; in 1879, 3008; in 1880, 3390; in 1881, 3577; in 1882, 3974; in 1886, about 5000 miles. The total lands given to railroads by acts of Congress from 1850 to 1884 were 7,801,349 acres.

Religion.—The State may still be considered as on the frontier, and the state of society is to be measured somewhat by this standard. The presence of many foreigners from the north of Europe has given tone to the morality of the State in many sections. Many of these foreigners have brought their religious convictions and churches with them, and, on the whole, the morality of the State is a good average with more densely populated ones. The number of denominations is out of all proportion to the number of members. The numbers of churches, ministers, and members appear in the following schedule:

Denominations.	Churches.	Clergymen.	Members.
Roman Catholic	212	157	139,500 pop.
Lutheran	418	232	55,000
Methodist Episcopal	242	182	20,355
Baptist, regular	140	110	7,026
Presbyterian	116	88	6,717
Congregational	137	112	6,702
Protestant Episcopal	56	68	4,584
Evangelical Association	46	52	3,750
Reformed	18	11	2,209
United Evangelical	14	9	1,955
Second Advent	16	15	1,800
Christian	25	12	1,625
Seventh-Day Advent	55	16	1,272
United Brethren	12	20	1,201
Free-Will Baptist	31	30	1,024
Moravian	7	5	607
Wesleyan Methodist	17	19	475
Protestant Methodist	2	26	400
Dunkards	4	8	400
Universalist	8	15	323
Seventh Day Baptist	4	3	302
United Presbyterian	7	5	288
Friends	3	2	261
Reformed Episcopal	1	1	160
Free Methodist	10	12	153
Jews (whole number 416)	1	1	38

Banks.—The following report of the national banks of the State and of the reserve city of St. Paul is from the report of the comptroller of the treasury for the close of 1884:

Resources.	State, 43 banks.	St. Paul, 6 banks.
Loans and discounts	$14,697,450.75	$13,474,671.98
Bonds for circulation	1,563,000.00	550,000.00
Bonds for deposits	....	500,000.00
U. S. bonds on hand	5,200.00	
Other stocks and bonds	272,978.60	331,548.89
Due from reserve agents	1,420,290.97	1,095,283.38
Due from national banks	1,107,652.05	253,708.09
Due from State banks	195,628.87	292,443.53
Real estate, etc	585,898.34	554,148.71
Current expenses	90,027.25	34,712.27
Premiums paid	76,463.16	22,390.96
Cash items	458,446.20	41,674.57
Clearing-house exchanges	....	305,966.89
Bills of other banks	284,985.00	197,561.00
Fractional currency	3,509.87	5,147.73
Trade dollars	313.60	
Specie	794,336.83	756,837.59
Legal-tender notes	511,951.00	390,502.00
Due from U. S. Treasury	72,980.30	32,326.22
Total	$22,141,112.79	$18,838,923.81

Historical.—The first territorial governor was Alexander Ramsey, appointed in 1849 and holding office until 1853; Willis A. Gorman from 1853 to 1857; Samuel Medary from 1857 to 1858. The first governor of the State was Henry H. Sibley, elected in 1858 and holding office until 1860. The State furnished 24,020 volunteers for the Federal armies in the civil war of 1860–65. The total number of pensioners of the late war, including disabled soldiers, widows, minor children, parents, is 4832. (A. G. M.)

MINOT, GEORGE RICHARDS (1758–1802), an American jurist and historian, was born at Boston, Mass., Dec. 28, 1758. He graduated at Harvard in 1778, and was admitted to the bar in 1781. He became clerk of the Massachusetts legislature in 1782; was appointed judge of probate for Suffolk county in 1792, and became chief-justice of the court of common pleas in 1799. He died at Boston, Jan. 2, 1802. He was one of the founders of the Massachusetts Historical Society, and edited three volumes of its *Collections*. His works are a *History of the Insurrection in Massachusetts in* 1786 (1788), and a continuation of Hutchinson's *History of Massachusetts Bay* (2 vols., 1798–1803).

His son, **GEORGE MINOT** (1817–1858), published many volumes of *Reports* of the Supreme Court of Massachusetts, and edited the *U. S. Statutes at Large.*

See Vol. XVI. p. 514 Am. ed. (p. 491 Edin. ed.).

MINT. The name of a family of herbaceous plants, of low economical importance, yet many of them strongly and agreeably odorous. There are about 2500 species in all, of which about 200 belong to North America. Of well-known European species may be named lavender, rosemary, white hoarhound, thyme, and sage, all now found generally in gardens. Catnip, balm, horsemint, and many others are used as family medicines. *Mentha*, the typical genus of mint, contains several very familiar species, particularly spearmint and peppermint, both naturalized from Europe, but now common in this country. Another well-known and highly fragrant species is that known as pennyroyal. These three species possess stimulating and carminative properties, and are used in medicine. Corn-mint, or field-mint, has an odor like that of decayed cheese. The common American species, *M. Canadensis*, the wild or horsemint, has in some varieties an odor like pennyroyal. It is found from Kentucky northward. From spearmint there is distilled an oil, from which are prepared an essence and a water, both used to disguise the taste of medicine. Peppermint, which is less fully naturalized in America, is cultivated to a considerable extent for its oil. Formerly this cultivation was confined to Massachusetts, New York, and part of Ohio. It is now largely conducted in Michigan, where some years ago 2000 to 3000 acres were planted. The oil is chiefly used to flavor confectionery. The essence of peppermint—a solution of the oil in alcohol—is a popular carminative. (C. M.)

See Vol. XVI. p. 503 Am. ed. (p. 480 Edin. ed.).

MINT. The mints of the United States are manufacturing establishments where money is coined under conditions imposed by Congress. They are under the charge of a bureau of the U. S. Treasury Department, called the Bureau of the Mint. The chief officer is called the Director of the Mint. His office is in Washington, D. C., and he receives an annual salary of $4500. There are now five mints, located in the cities of Philadelphia, New Orleans, San Francisco, Carson City, Nev., and Denver. The three first named are in active operation. The mint at Carson City is equipped for coinage, but its business has been reduced to that of an assay office. The mint at Denver has never been more than an assay office. There are assay offices also at New York, St. Louis, Boisé City, Idaho, Helena, Mont., and at Charlotte, N. C. The chief officer in each mint and in the assay office in New York is the superintendent, and receives an annual salary of $4500, except at Carson City, where he receives $3000. The chief of the assay offices, except in New York, is called the assayer. His usual salary is $2500, but at Boisé City he receives $2000, and at Charlotte $1500.

The first U. S. mint was established at Philadelphia by act of Congress of April 2, 1792. It was under the personal supervision of the Director of the Mint until the passage of the coinage act of 1873. The mints at New Orleans, La.; Charlotte, N. C., and Dahlonega, Ga., were established in 1835. The mint at San Francisco was established in 1854, and that at Carson City, Nev., in 1870. The several assay offices were established as follows: at New York, in 1854; at Denver, Col., in 1864; and at Boisé City, Idaho, in 1872; at Helena, Mont., in 1874, and at St. Louis in 1881. Coinage was done at the branch mint at Charlotte from 1836 until it was closed by the war of the rebellion. Its work has since been limited to the business of an assay office, its equipment for coinage having been removed during the war. At the branch mint at Dahlonega, also, coinage was done from 1838 to 1861. In 1871 this property was given by the government to the North Georgia Agricultural College.

In 1873 the Bureau of the Mint was established as a division of the Treasury Department, and the mint at Philadelphia was placed in charge of a superintendent, as the other mints had been. The

Bureau of the Mint not only has charge of the coinage for the government, but also assays at fixed rates precious metals for private owners and collects statistics of the production of these metals in the United States.

Minting.—Gold is received at the mint in the form of amalgam, dentists' plate, old jewelry, photographers' waste, etc., but principally in the form of native grains and dust. The gold received at the mint not unfrequently contains a great variety of base metals, which destroy its ductility and render it entirely unfit for coin. It is therefore necessary to eliminate these admixtures, and then to effect the removal of silver. Silver bullion is received at the mint in the form of bars, pigs, doré silver, old plate, and coin. Whole altars of silver and many silver statues of saints were in former times received from Mexico. The silver bullion is frequently rendered exceedingly "short" or brittle by the admixtures of base metals, which must first be eliminated before the metal is fit for coinage, and this purification process is technically termed "toughening." The gold or silver to be minted is delivered at the mint either through the express companies or otherwise, and is received in the deposit or weighing-room. The scales in this room are very delicate, and are usually examined and adjusted on alternate days. The largest weight used in the weighing-room at the mint in Philadelphia is 500 ounces; the smallest weight is .001 ounce Troy.

When a gold deposit, consisting perhaps of old coin and jewelry, is received at the counter of the weighing-room, the material is weighed in the presence of the depositor or the agent of the express company and the proper officials of the mint; the metal is next placed in an iron box, which is then doubly locked and carried in that condition to the "deposit melting-room;" here the iron boxes are unlocked by two men, each of whom is provided with a key to one of the two separate locks placed upon each box. In the mint at Philadelphia there are four furnaces in the melting-room, and here the metal is placed in pots and melted under a protective covering of borax, the contents of each pot being constantly stirred to render the mass homogeneous. After the metal has been properly melted it is next cast in a bar or "shoe" mould, and when the metal is cooled it is again taken to the deposit or weighing-room, where it is reweighed; this weight is the one at which the mint receives the deposit. A small chip is now cut from the bar for purposes of assay. A rigid analysis is made of the sample thus obtained, and the result of the assay determines the value of the entire mass, by calculation to the fraction of a cent, and the depositor is paid accordingly. The largest weight used by the assayer is the demi-gramme (about 7.7 grains Troy), and as the value of the metal deposited frequently represents many thousands of dollars, it is manifest that even the slightest error in the assay would amount to a considerable sum total; the assayer therefore carries into actual analysis to the 10000th degree, viz.: the 1-20th of a milligramme, or the 1-1295th part of a Troy grain. For convenience of cutting, the assayer rolls the sample into a thin ribbon; the weight of half a gramme of this gold alloy is enclosed in an envelope of pure lead, and melted in the muffle of the assay furnace, in a small cupel made of pressed calcined bones. The lead is quickly oxidized, in which condition it is more fluid than the melted precious metal; it consequently passes into the pores of the cupel, conveying with it all the base metals combined in the alloy; the button of precious metal remaining is then very carefully weighed, and the proportional admixture of base metal determined; there is then made another weighing of the sample as in the previous case; but to this there are added fine silver granulations in the proportions of about two parts of silver to one of gold. The alloy is cupelled as in the former case, and the silvery button remaining is laminated, coiled into a "cornet" and boiled in nitric acid. By the last operation all the silver is dissolved by the acid, leaving a roll of pure gold after the completion of the boiling; the gold cornet is then annealed and weighed; this weight is the proportion of gold; the difference between the second and first weight is the proportion of silver.

When silver bullion is brought to the melting-room, the metal is placed in a sand-pot and melted with an oxidizing agent, such as nitre, together with a protective covering of borax. The precious metal is then cast into bars, but another process, technically termed "parting," is necessary to separate the silver from the gold. For this purpose the gold deposits containing silver, and the silver deposits containing admixtures of gold, are thrown into the pot and melted together so as to make the relative proportions about one pound of gold to two pounds of silver; in former times three parts of silver were deemed necessary; thus giving rise to the old term, "inquartation." From the melting-pots the molten metal is poured into ice-water, thus disintegrating the metal into "granulations," which are next placed in porcelain jars having a capacity of about 50 gallons each. By adding nitric acid and applying steam-heat for several hours the silver is converted into a soluble nitrate, and the gold settles to the bottom of the jars in the form of a brownish powder, which is collected after the solution of silver is removed. The solution of silver is transferred by means of a large gold siphon into a wooden vat containing about 1200 gallons of salt water. The precipitated chloride of silver is collected on filters, next washed, and afterwards brought to the metallic state by means of granulated zinc and dilute sulphuric acid. The chlorine deserts the silver and unites with the zinc. The gold and silver are next pressed into large cakes, which are placed in an oven, and after being dried at a moderate heat they are melted in large crucibles, from which they are poured and cast into fine bars for stamping, or the necessary proportion of copper is added for coin ingots. The chlorine process has been used with considerable success of late years in the "parting." Silver was formerly assayed by cupellation; but, as the results obtained were not accurate, it was superseded by the volumetric process invented by Gay Lussac, the rationale of which method is that a given proportion of chlorine will precipitate a definite proportion of pure silver. After leaving the separating-room the gold or silver is carried to the melting-rooms, where all the metal used in coins is melted, alloyed, and cast into narrow strips called ingots. The melting-rooms in which the copper and nickel and the other base metals used for alloys are melted are separate from the department in which the gold and silver are melted.

Coining.—The ingots are carried from the melting-rooms into the rolling-room. The necessary power for working the machinery in the coining department of the Philadelphia mint is derived from a large steam-engine of 160 horse-power. Sometimes more power is required to be exerted by the engine than is the case at other times; to meet this irregularity, and to insure that steadiness of motion so necessary in such delicate operations, a governor and throttle-valve of peculiar construction are used on the engine. The rolling-mills, four in number, in this mint are driven by suitable belts, at the rate of 6 revolutions per minute; the distance between the rollers being adjusted by double wedges, moved by a train of wheels which are connected with a dial-plate and hands, divided and numbered into hours and minutes, so as to indicate the proper thickness of the strips of metal without the use of gauges. Gold strips are annealed and waxed with a cloth dipped in melted wax, and the silver strips are coated with tallow by means of a brush; the annealing, etc., between the operations of rolling, are intended to prevent the breaking of the ingots while they are being rolled and reduced. It is not possible to reduce the strips of metal to a perfectly uniform thickness in the rolling machine, consequently they are next carried to the drawing bench, where they are drawn by means of machinery through suitable cylinders, which reduce the thick portions of the strips; trial pieces being cut from each strip and their weight tested, preparatory to the cutting of the whole. The strips are next thoroughly washed in water and are then carried to the cutting machines, which are usually in the rear of the rolling-mills. The cutting machines consist of a vertical steel punch which is operated by means of a suitable shaft and pulleys; on the shaft there is a fly-wheel of small diameter, but sufficient in momentum to drive the punch through the strip of metal by means of a ⅜-inch eccentric, at the rate of 250 pieces per minute, which rate of speed skilled operatives can readily continue until the strip is exhausted. The planchets after being cut from the strip are carried to the adjusting-room, where they are adjusted and undergo an inspection and careful weighing on very accurate scales. Planchets which are of slight overweight are filed off at the edges; but those which are found to be too heavy for this operation are thrown aside with the light ones and are afterwards remelted. The whitening of planchets is accomplished by enclosing the gold in luted boxes, and by exposing the silver in an open pan to the heat of a simple furnace with wood fuel; the drying and sifting, after subjecting them to the action of dilute sulphuric acid, are rapidly and effectually accomplished by a rolling screen. The planchets after leaving the adjusting-room are carried to the milling- and coining-room. The "milling" operation is accomplished by machinery, the object of milling being to thicken and prepare the edge of the planchets, so as to give a better and more protective border to the coin. The planchets are next carried to the coining presses, which are of three sizes, the largest being applicable to the striking of silver dollars and double-eagles; the second to pieces of medium value; and the smallest to the dime, half-dime, and 3-cent pieces. The coining presses are attended by women. The coin pieces are next carried to the coiner's room, where the light and heavy coins are mixed together in such proportion as to give him full weight in every delivery as required by law. The coins are then counted and placed in canvas bags for delivery as required.

The mint at Philadelphia is the only one in the United States at which all the authorized coins are struck; only gold and silver coins being coined at the other mints.

The following table shows the weight and fineness of all the denominations of coins used in the United States, and all the dates of the various acts of Congress relating to the same. By the act of Congress establishing the U. S. Mint the following coins were authorized: *Gold*, eagle, half-eagle, quarter-eagle; *silver*, dollar, half-dollar, quarter-dollar, dime, half-dime; *copper*, cent, half-cent. Changes have been made at various times, not only in weight and fineness but also in the metals used for the minor coins. At present the following coins are struck: *Gold*, double-eagle, eagle, half-eagle, three-dollar, quarter-eagle, dollar; *silver*, dollar, half-dollar, quarter-dollar, dime; *minor coins*, of nickel and bronze, 5-cent, 3-cent, cent.

The trade-dollar, which was authorized to be coined in 1873 for the convenience of American merchants in China, was not intended to be a coin of legal tender in the United States, though it did come into partial domestic use. By the joint resolution of Congress, July 22, 1876, it was expressly declared not to be a legal-tender, and its further coinage placed at the discretion of the secretary of the treasury. From 1874 to 1878 the amount coined was $35,959,360. It has not been coined since 1878.

By the act of February 12, 1873, the metric system was to a certain extent used in determining the weight of the silver coins. Thus, the half-dollar was to weigh 12½ grams, the quarter-dollar 6¼ grams, the dime 2½ grams. In the following table these weights have been given in grains:

Coins.	Date of law.	Weight grains.	Fineness.
GOLD:			
Double-eagle........	March 3, 1849.	516	900
Eagle........	April 2, 1792.	270	916⅔
	June 28, 1834.	258	899.225
	Jan. 18, 1837.	....	900
Half-eagle...........	April 2, 1792.	135	916⅔
	June 28, 1834.	129	899.225
	Jan. 18, 1837.	....	900
Quarter-eagle.......	April 2, 1792.	67.5	916⅔
	June 28, 1834.	64.5	899.925
	Jan. 18, 1837.	....	900
3-Dollar piece......	Feb. 21, 1853.	77.4	900
Dollar................	March 3, 1849.	25.8	900
SILVER:			
Dollar.................	April 2, 1792.	416	892.4
	Jan. 18, 1837.	412½	900
Discontinued.	Feb. 12, 1873.		
Reauthorized.	Feb. 28, 1878.		
Trade-dollar.........	Feb. 12, 1873.	420	900
Demonetized.	July 22, 1876.		
Half-dollar	April 2, 1792.	208	892.4
	Jan. 18, 1837.	206¼	900
	Feb. 21, 1853.	192	
	Feb. 12, 1873.	192.9	
Quarter-dollar......	April 2, 1792.	104	892.4
	Jan. 18, 1837.	103⅛	900
	Feb. 21, 1853.	96	
	Feb. 12, 1876.	96.45	
20-Cent................	March 3, 1875.	77.16	900
Discontinued.	May 2, 1878.		
Dime...................	April 2, 1792.	41.6	892.4
	Jan. 18, 1837.	41.25	900
	Feb. 21, 1853.	38.4	
	Feb. 12, 1873.	38.58	
Half-dime...........	April 2, 1792.	20.8	892.4
	Jan. 18, 1837.	20⅝	900
	Feb. 21, 1853.	19.2	
Discontinued.	Feb. 12, 1873.		
3-Cent................	March 3, 1851.	12⅜	750
	March 3, 1853.	11.52	900
Discontinued.	Feb. 12, 1873.		
MINOR COINS:			
5-Cent (nickel).....	May 16, 1866.	77.16	75 per cent. copper, 25 per cent. nickel.
3-Cent (nickel).....	March 3, 1865.	30	75 per cent. copper, 25 per cent. nickel.
2-Cent (bronze).....	April 22, 1792.	96	95 per cent. copper, 5 per ct. tin and zinc.
Discontinued.	Feb. 12, 1873.		
Cent (copper).......	April 2, 1792.	264	
	Jan. 14, 1793.	208	
	March 3, 1795.	168	
Discontinued.	Feb. 21, 1857.		
Cent (nickel)........	Feb. 21, 1857.	72	88 per cent. copper, 12 per cent. nickel.
Discontinued.	April 22, 1864.		
Cent (bronze).......	April 22, 1864.	48	95 per cent. copper, 5 per ct. tin and zinc.
Half-cent (copper)	April 2, 1792.	132	
	Jan. 14, 1793.	104	
	March 3, 1795.	84	
Discontinued.	Feb. 21, 1857.		

In order to secure a due conformity in the gold and silver coins to their respective standards of fineness and weight, an assay commission, consisting of the judge of the District Court for the Eastern District of Pennsylvania, the comptroller of the currency, the assayer of the assay office at New York, and other persons designated by the President, meets annually on the second Wednesday of February at the mint in Philadelphia, to examine and test the fineness and weight of the coins reserved by the several mints for this purpose. The law requires that the superintendent of each mint at every delivery of coins made by the coiner shall take indiscriminately a certain number of pieces of each variety for the annual trial, the number for gold coins being not less than 1 piece for each 1000 pieces or less delivered; and for silver coins 1 piece for each 2000 pieces or less. The pieces so taken are carefully sealed up in an envelope, properly labelled, with date, number, and amount of the delivery from which they were taken. These sealed parcels are deposited in a pyx, kept under the joint care of the superintendent and assayer. The reserved pieces in their sealed envelopes from the coinage of each mint are transmitted quarterly to the mint at Philadelphia.

The following are the maximum deviations allowed: In gold ingots for coinage .001 in fineness; in silver ingots .003. In the weight of single pieces half a grain is allowed in the weight of an eagle or double-eagle, and ¼ grain for other gold coins. But in weighing a number of pieces together when delivered by the coiner to the superintendent the deviation must not exceed .01 ounce in $5000, and in gold dollars must not exceed that amount in 1000 pieces. In silver coins the deviation of 1½ grains is the maximum for a single piece, and .02 ounce for each $1000, but .01 ounce for 1000 dimes.

When the annual assay commission has organized it usually appoints committees on counting, on weighing, and on assaying, and tests are made of the weight and fineness of the coins reserved as before stated. The assay committee, in the prosecution of their labors, test the inquartation silver, the copper, and the lead used in assaying gold bullion, in order to be satisfied that they contain no gold. The weights employed are also tested. The acid used for the humid assay of silver is also carefully tested to see that it contains neither silver nor chlorine in perceptible quantity. If greater deviation than that allowed by law is found to exist in the coins, the fact is certified to the President, who has power to disqualify the officers implicated in the error from holding their respective offices. Practically this has never taken place.

In February, 1878, Congress passed over the veto of Pres. Hayes an act directing the secretary of the treasury to purchase silver bullion to the amount of not less than $2,000,000 nor more than $4,000,000 worth per month, and cause the same to be coined monthly as fast as purchased. This act has remained in force till the present time. The superintendents of the mints have also been constituted assistant treasurers, to receive gold coin or bullion on deposit and issue coin certificates therefor. The effect of these measures has been to make the mints and other U. S. depositories places of safe deposit for individual owners, while the certificates serve as a circulating medium.

The following statement shows the coinage in the United States from the organization of the mints in 1793 to the close of the fiscal year ending June 30, 1885:

GOLD COINAGE.

Period.	Double-eagles.	Eagles.	Half-eagles.	Three dollars.	Quarter-eagles.	Dollars.	Total.
1793 to 1848	....	$25,662,270	$45,265,355	....	$5,413,815.00	....	$76,341,440.00
1849 to 1873	$646,727,980	29,851,820	22,994,390	$1,169,913	20,804,702.50	$19,015,633	740,564,438.50
1874	48,283,900	383,480	809,780	125,460	516,150.00	323,920	50,442,690.00
1875	32,748,140	599,840	203,655	60	2,250.00	20	33,553,965.00
1876	37,896,720	153,610	71,800	135	53,052.50	3,645	38.178.962.50
1877	43,941,700	56,200	67,835	4,464	5,780.00	2,220	44,078,199.00
1878	51,406,340	155,490	688,680	137,850	408,900.00	1,720	52,798,980.00
1879	37,234,340	1,031,440	1,442,130	109,182	1,166,800.00	3,020	40,986,912.00
1880	21,515,360	18,836,320	15,790,860	9,090	3,075.00	3,030	56,157,735.00
1881	15,345,520	33,389,050	29,982,180	4,698	9,140.00	3,276	78,733,864.00
1882	14,563,920	44,369,410	30,473,955	75	62 50	6,025	89,413,447.50
1883	27,526,120	6,611,790	1,775,360	4,665	10,137.50	8,855	35,936,927.50
1884	23,765,900	2,033,040	2,116,020	2,955	4,930.00	9,979	27,932,824.00
1885	20,048,500	2,246,890	2,545,900	5,670	6,982.50	7,184	24,861,123.50
Total	$1,021,004,440	$165,380,650	$154,227,900	$1,574,217	$28,405,777.50	$19,388,524	$1,389,981,508.50

SILVER COINAGE.

Period.	Dollars.	Half-dollars.	Quarter-dollars.	Twenty cents.	Dimes.	Half-dimes and three cents.	Total (including trade-dollars).
1793 to 1852	$2,506,890	$66,249,153.00	$3,999,040.50	....	$3,890,062.50	$2,568,225.90	$79,213,371.90
1853 to 1873	5,538,948	33,596,082.50	18,002,178.00	....	5,170,733.00	3,620,571.20	65,928,512.70
1874	....	1,438,930.00	458,515.50	....	497,255.80	....	5,983,601.30
1875	....	2,853,500.00	623,950.00	$5,858	889,560.00	....	10,070,368.00
1876	....	4,985,525.00	4,106,262.50	263,560	3,639,105.00	....	19,126,502.50
1877	....	9,746,350.00	7,584,175.00	1,440	2,055,070.00	....	28,549,935.00
1878	8,573,500	3,875,255.00	3,703,027.50	142	760,891.00	....	28,290,825.50
1879	27,227,500	225.00	112.50	....	45.00	....	27,227,882.50
1880	27,933,750	3,275.00	3,837.50	....	1,575.00	....	27,942,437.50
1881	27,637,955	4,677.50	3,638.75	....	3,695.50	....	27,649,966.75
1882	27,772,075	5,537.50	3,268.75	....	2,507.50	....	27,783,388.75
1883	28,111,119	2,759.50	4,079.75	....	717,511.90	....	28,835,470.15
1884	28,099,930	4 465.00	3,832.50	....	665,160.30	....	28,773,387.80
1885	28,528,552	2,557.50	2,178.75	....	315,671.40	....	28,848,959.65
Total	$211,930,219	$122,768,292.50	$38,498,097.50	$271,000	$18,608,843.90	$6,188,797.10	$434,224,610.00

MINOR COIN.

Period.	Five cents (since 1866).	Three cents (since 1865).	Two cents (from 1864).	Cents.	Half-cents.	Total.
1793 to 1873	$5,276,140.00	$805,350.00	$912,020.00	$4,886,452.44	$39,926.11	$11,919,888.55
1874	244,350.00	29,640 00	....	137,935.00	....	411,925.00
1875	94,650.00	12,540.00	....	123,185.00	....	230,375.00
1876	132,700.00	7,560.00	....	120,090.00	....	260,350.00
1877	25,250.00	....	....	36,915.00	....	62,165.00
1878	80.00	48.00	....	30,566.00	....	30,694.00
1879	1,175.00	984.00	....	95,639.00	....	97,908.00
1880	1,247.50	982.50	....	267,741.50	....	269,971.50
1881	177.75	32,416.65	....	372,515.55	....	405,109.95
1882	220,038.75	104.25	....	424,614 75	....	644,757.75
1883	1,022,774 40	858.57	....	404,674.19	....	1,428,307.16
1884	768,745.25	244.86	....	405,719.62	....	1,174,709.73
1885	351,691.00	144.60	....	175,721.20	....	527,556.80
Total	$8,139,019.65	$890,873.43	$912,020.00	$7,481,769.25	$39,926.11	$17,463,608.44

(C. T. D.)

MINUIT, Peter (*c.* 1580–1641), a Dutch colonial governor, founder of New York and first settler of Delaware, was born in Wesel, Rhenish Prussia, about 1580. He became deacon of the Walloon Church at this place, and in December, 1625, he was appointed by the Dutch West India Company governor and director-general of New Netherlands. Landing on Manhattan Island, May 4, 1626, he purchased the island from the Indians for sixty guilders, and built Fort Amsterdam. To this place he drew most of the colonists who had settled at Albany. In August, 1631, he was recalled by the company on the ground of having shown too much favor to the patroons. When Sweden began to undertake colonization projects in America, Minuit secured an appointment as leader of its attempt, and sailed in 1637 from Gothenburg with a body of Swedes and Finns. In April, 1638, he began to build Fort Christina, so named from the daughter of Gustavus Adolphus, then queen of Sweden. It was situated near the present city of Wilmington, Del. Here Minuit died in 1641. (See Delaware, Vol. II., p. 597.)

MIRACLES, a class of phenomena associated with the origin of the Mosaic and Christian religions.

I. The word *Miracle* is from the Latin word *Miror*, to wonder. These events are designated by the Hebrew words אוֹה, *signum portentum;* מֶלֶא, something separated, singular; בְּבוּרָה, *power*, some extraordinary manifestation of divine power. Also by the Greek words *τέρατα*, wonders; *δυνάμεις*, powerful works, manifesting divine power; *σημεῖα*, signs.

II. *The events themselves, their nature and relations.*—Miracles were a class of supernatural events. Every miracle is supernatural, but every supernatural event is by no means a miracle. The supernatural is that which transcends nature. Nature (from *nascor*, to be born) is that which generates or is the result of a process of generation. The whole material universe, viewed as a fecund cause, is *natura naturans*, nature generating; and viewed as a manifold product the same universe is every moment the *natura naturata*, or nature just brought to the birth. Philosophers and theologians differ widely as to where they draw the line between the natural and the supernatural. 1. Many, as Coleridge and Bushnell, draw it between matter and spirit, between the unconscious and mechanical, and the conscious free, and hence just between the body and soul of man. The unconscious and animal part of man's activity belongs to the natural, while his free rational agency belongs to the supernatural. Whatever ground there may be for this distinction it will not help us in this discussion. The souls as well as the bodies of men come under the law of heredity. Inherited nature preconditions personal agency. In the sense that miracles are supernatural, all human activity is natural. 2. Others draw the line just between man and the angelic world. The *supernatural* with them is equivalent to the superhuman. All that pertains to the disembodied spirits of dead men, or to angels or devils, is thus called supernatural. This is a common and legitimate use of the word. But this is only a relative use of the term. All created spirits as well as all created worlds have their God-given natures and are subject to law. Every adequate sense of the word "nature" must take in the universe as a whole. It is one system, and cannot be divided in parts mutually independent. 3. Consequently we draw the line between the natural and the supernatural in this discussion, between God and the universe, the absolute and the contingent, the Creator and the creature. The supernatural, therefore, is a peculiar kind or mode of God's action on and through his creatures. It is common to regard *creation* as a type of the *supernatural* and of the *miraculous*. But the distinction is obvious and important. Creation, or the bringing of the thing into existence, must differ essentially from every mode of divine action on it or through it after it is existent.

Creation is God's bringing his creatures, or the elements out of which they are formed, into existence.

Ordinary Providence is God's sustaining and governing all his creatures and all their actions after they are created. This ordinary providence always operates through natural causes, and according to the uniformities of natural law.

The *supernatural working* of God embraces all of his various modes of acting upon and through his creatures wherein he produces effects beyond the range of their natural powers, and different from the uniform method of natural law. These include such effects as (1) special interventions in the interests of his *moral* government; (2) gracious operations in the souls of Christ's people; (3) revelation of new truth, and an inspiration controlling the activities of the prophet in the communication of truth; (4) miracles in the special and technical sense of that word.

Miracle is a technical word connoting a special matter in controversy, viz., a class of supernatural events alleged to have occurred in connection with the origin of the Jewish and Christian religions, recorded in the Old and New Testaments as modes of God's attestation to the divine origin of those religions.

We exclude therefore from this discussion: (1) All spiritualistic phenomena, ghost-flitting, spirit-rapping, demoniacal possession or other manifestations of merely superhuman power. (2) All extraordinary providences, turning on striking coincidences, as the draught of fishes and the flight of quails mentioned in Scripture. (3) All the gracious acts of God in the spiritual sphere, regenerating and sanctifying the souls of his people. (4) All of his supernatural operations in the minds and hearts of his prophets, disclosing future events, revealing truth, and inspiring them as public teachers.

The "miracle," therefore, in the technical sense of that word, should be defined thus: (1) An event (2) occurring in the material world, (3) obvious to the senses, (4) of such a nature that it can be rationally referred only to the immediate act of God as its direct cause, (5) accompanying a teacher of religion sent from God, (6) and designed to authenticate his divine commission.

When it is said that a miracle is an event of such a nature that it can be rationally referred only to an immediate act of God as its direct cause, it is not meant that God is the only cause which operates in producing it. What is meant is that the direct intentional agency of God is always discerned as one of its active causes, and the one which gives it its differentiating characteristics as a miracle. It is well known that the physical cause of any event in the physical world is never single; it is always dual if not manifold. All the necessary conditions upon which the event depends are its concauses. The effect consists of all these conditions in a changed condition. If we kindle a fire the concauses are the atmosphere, the chimney-flue, the fuel, the match, the agency of the person combining all those conditions. The effect is the change thus effected in the person, the match, the atmosphere, the flue, and the fuel. In every miracle all surrounding and implicated natural bodies remain and act through the miracle in a manner perfectly true to nature under the peculiar conditions in which they are placed. But God, acting invisibly and from within, interpolates a new force, his own direct energy, into the plexus of concauses naturally in operation, and the result is the "miracle." When the iron was made to float in the water, earth, air, water, and iron all remained acting according to the law of their nature. But God did, invisibly and from within, what human agency in this case might have accomplished visibly and from without, *i. e.*, he simply interpolated a force acting in a direction contrary to that of gravity, equal to the difference of weight of the iron to the weight of the equal bulk of water which it displaced.

III. It is asserted by sceptics that a miracle in the sense just defined is impossible. 1. Because it involves a violation of invariable natural laws. But this is an entire misconception. An act of God modifying the action of natural causes no more interrupts the law of physical continuity than an act of man doing the same thing. The act of God in working a miracle destroys no natural force, nor changes the law of its action. It only changes the conditions of its action, and then the natural force naturally acts differently under the changed conditions. In all man's action in this world he uses his intelligence to bring the forces of nature into artificial combinations, and the result is at the same time (*a*) natural (*b*) yet a modified nature, and (*c*) an unquestionable evidence of man's direct agency. The electric current carrying messages through the ocean cables is as much an exhibition of natural law as the original stroke of forked lightning from the sky. But in addition to this it is moreover an immediate and intentional revelation of man. The same is true of the behavior of all the natural forces implicated in a miracle. While at the same time the resultant action is an immediate and intentional revelation of God.

This is fully admitted by John Stuart Mill, the profoundest and clearest-minded of all the agnostic thinkers of this century, in the fourth part of his *Essay on Theism*, published since his death by his step-daughter, Helen Taylor. "The interference of human will with the course of nature is only not an exception to law, when we include among laws the relation of motive to volition; and by the same rule interference by the divine will would not be an exception either, since we cannot but suppose Deity, in every one of its acts, to be determined by motives." "It is true that human volition exercises power over objects in general indirectly through the direct power it possesses over human muscles. God, however, has direct power not merely over one thing, but over all the objects which he has made." "Divine interferences with nature could be proved if we had the same sort of evidence for it that we have for human interferences."

2. Miracles are declared to be impossible, since God is immutable, eternally perfect in wisdom and power, and therefore he can have no need to change his plan, nor by direct interference modify his work. Theodore Parker said, "There is no whim in God, therefore no miracle in nature." This objection is absurdly irrelevant. The miracle involves no change in God's plan. Each one of them was foreseen and predetermined as an integral part of his eternal all-comprehensive plan from the beginning. Neither does it imply any defect in his work. No miracle was ever designed to correct the equilibrium of the physical world. The physical world is controlled by forces and their interactions. The moral world is governed by ideas, reasons, motives addressed to the will, by discipline forming character. A moral system involves free agency as a fact independent of all theory as to its nature. Free agency involves liability to sin. Sin, as an actual fact, necessitates divine intervention, either to punish or to redeem. Redemption involves the stupendous miracles of the incarnation and of the resurrection, susceptible both of demonstrative evidence, and all other miracles are accompaniments of these. We admit that if there be no moral system, of which the physical system of the world is only the foundation, there can be no miracle. But if there be a moral system, in which the moral and spiritual education of his children is the chief concern of our Heavenly Father, miracles are not incredible, because not improbable.

IV. It is asserted by sceptics that miracles are so violently improbable, that even if they occurred that occurrence could not be proved to non-witnesses by any amount of human testimony. This is one fallacy underlying the famous argument of David Hume against the credibility of miracles. We all would willingly agree to this principle if the physical universe is to be regarded as a self-contained system by itself. From their very nature miracles must be to the last degree exceptional. Their frequent or sporadic occurrence would reduce the material world to chaos, would confuse the reason and paralyze the activity of man and obscure the providence of God. But if a moral government is admitted, the facts of man's moral and spiritual condition, and his relation to God being what they are determined to be by natural religion, then a direct intervention of the Heavenly Father in behalf of his bewildered and helpless children is in the highest degree probable. If God directly intervenes to instruct and educate his children, revelations and miracles must co-operate in that work. A detached, objectless miracle would be unprovable. But a system of miracles, mutually supporting, like those recorded in the Christian Scriptures, evidently bearing a divine redemptive character, and all constituting parts of one redemptive scheme, all issuing from one source, and bearing upon one end, and associated directly with persons bearing the aspect of celestial messengers, teaching a spiritual doctrine, self-evidencing itself to be the word of God, then, and in such conditions alone, miracles become in the highest degree probable, and hence are to be received as true when accompanied with competent historical evidence.

V. It is objected by sceptics that miracles as above defined, even if they actually occurred, could not be certainly recognized as such by us. 1. Because our knowledge of the powers and laws of nature are limited, and we are therefore never competent, in view of any wonderful phenomenon transcending all past experience, to say peremptorily that it transcends nature and must have been immediately caused by God. This is true in part, but irrelevant. The question does not relate to the possible achievements of science in the future, but to what was done through religious teachers originating in an obscure province of the Roman empire two thousand years ago. Besides, science secures its wonderful results by means of apparatus of elaborately adjusted conditions. The miraculous effects occurred in conjunction with a simple word of command. Besides this science has closed some doors while it has opened others. It is now scientifically certain that a man four days dead, in a hot climate, cannot be raised by natural forces alone. If the events in question actually occurred as related, then it is certain that they reveal "the finger of God."

2. It is objected that the phenomena in question, although transcending physical law, may nevertheless be produced by some unknown superhuman agency, as the devil or his angels. This may be true as far as the isolated fact as a physical event goes, although we have no evidence that spirits of any kind have power of life or death over men. But the objection is irrelevant. The miracles were professed "signs" of divine intervention and commission. Good spirits would not conspire to counterfeit God and deceive men. Evil spirits could not, and would not be allowed to do so if they could. The prophet, the doctrine, and the miracle make one congruous whole, which in all its parts equally bear the unmistakable and uncounterfeitable sign-manual of God. Evil spirits would not conspire to build up the kingdom of God (Matt. xii. 25).

3. It is objected that of the phenomena in question we have only popular reports and no adequate scientific test. We acknowledge that the mass of people were then, as now, credulous and inaccurate observers. But in the case of the most important miracles recorded the tests to which the phenomena were subjected were all-sufficient. The whole question as to the resurrection of Christ is embraced in two definite facts: Was he really dead on Friday, and was he really alive again in the same body on Sunday? That he was really dead on Friday the whole educated world, rationalistic and believing, are agreed. The fact that he was really alive on Sunday and afterwards was tested in the strictest sense, scientifically, by many witnesses and especially by Thomas. They used one

sense to criticise and confirm the report of another. They saw, heard, and handled him, and thrust their "hands into the print of the spear." Many different persons saw, heard, and handled him, and in many different situations, through a space of six weeks. These persons were not deceived. They were good men, of sober minds, and henceforth they consecrated their lives "to preach Jesus and the resurrection." As conscious witnesses they were true, for they sealed their testimony as martyrs. As unconscious witnesses they could not deceive, for their unique experience transformed their characters and lives, from being Galilean fishermen to being world-compelling apostles.

VI. It is objected that the evidence of moral truth must be in itself, and that it cannot be established by any correlation with physical phenomena. But the gospel is not a disclosure of abstract moral truths, but of a series of objective facts, constituting the stupendous history of redemption. The incarnation, the crucifixion, the resurrection are the very substance of Christianity and its saving power, and these are all the central suns of the constellations of miracles recorded in the Bible. It is confessed that sporadic, inconsequent miracles could prove nothing and would themselves be difficult to prove. But given a supernatural crisis, a supernatural teacher, and a supernatural doctrine, miracles become in place like great jewels on the state robes of the king, and they contribute their indubitable quota to the sum of the evidence, as a genuine seal authenticates the genuine document to which it is attached, and is in turn authenticated by it. Apart neither could be believed; together neither can be doubted.

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(A. A. H.)

See Vol. XVI. p. 534 Am. ed. (p. 511 Edin. ed.).

MISSIONS, American Protestant. Among the causes that led to the English settlements in America, the desire to bring the gospel to the native tribes held a prominent place. In this respect these colonists stood out in favorable contrast with the Spanish adventurers who pressed eagerly into the south. By the English "the higher design was matured not to plunder, nor to destroy, nor to enslave; but to found states, to plant permanent Christian colonies, to establish for the oppressed and the enterprising places of refuge and abodes with all the elements of independent national existence."

When, in 1606, a royal patent was given by King James I. to the company asking for leave "to deduce a colony into Virginia," certain privileges were granted in the hope that the colony would be a means of Christianizing the native tribes and introducing among them the arts of civilization. The new colonists received directions as to maintaining the established doctrine and rites of the Church of England, and were specially charged to exercise kindness to the savages, and use all proper means for their conversion.

The Pilgrims, in looking for a field of usefulness as well as a place of rest, were moved "by a hope and inward zeal of advancing the gospel of the kingdom of Christ in the remote parts of the New World; yea, though they should be but as stepping-stones unto others for the performing so great a work." In 1621, only a year after the colony landed at Plymouth, Mass., Elder Robert Cushman sent back word to England that it was a very inviting missionary field for young men of that country who wished "to further the gospel among those poor heathen."

In describing the origin of the Massachusetts Bay Colony, Bancroft says that, in 1629, "Some friends in Lincolnshire fell into discourse about New England; imagination swelled with the thought of planting the pure gospel among the quiet shades of America." Subsequently the matter was agitated in London, "and from London, Lincolnshire, and the west country, men of fortune and religious zeal, merchants and country gentlemen, the discreeter sort among the many who desired a reformation in church government, 'offered the help of their purses' to advance 'the glory of God' by planting a colony of the best of their countrymen on the shores of New England." The charter of the governor and company of the Massachusetts Bay was granted by Charles I. on March 4, 1629. The seal that was chosen for the colony tells its own story. It "was an Indian erect with an arrow in his hand, and the motto, 'Come over and help us.'" It has been claimed, not unjustly, that both the Plymouth and the Massachusetts Bay Colonies were missionary colonies; and, for confirmation, attention is called to the fact that they came over well prepared for the prosecution of that work. Bancroft says of the latter: "As the propagation of the gospel was, by the free profession of the company, their aim in settling the plantation, they were careful to make plentiful provision of godly ministers, two of whom were specially added, that there might be enough, not only to build up those of the English nation, but also 'to wynne the natives to the Christian faith.'"

When the Quakers purchased West New Jersey and began their settlements, there was no distinct missionary purpose avowed; but they came to worship God and to pursue a kindly, peaceable policy toward men. Their influence on the Indians was felt immediately, and was at once beneficial. The scene at Burlington, when the Quakers gathered for worship under their large tent, and the Indian kings were met in council under the shade of the trees, was one that augured good. "They declared their joy at the prospect of permanent peace," says the historian. "'You are our brothers,' said the sachems, 'and we will live like brothers with you. We will have a broad path for you and us to walk in. * * * The path shall be plain; there shall not be in it a stump to hurt the feet.'"

When William Penn became the proprietor of Pennsylvania, he came to promote, among other objects, by the power of a Christian life, the welfare of the Indians. Hence, when a trading company offered him a large sum in hand and an annual revenue for the exclusive privilege of trading with the tribes, he used these memorable words: "I will not abuse the love of God, nor act unworthy of his providence, by defiling what came to me clean. No, let the Lord guide me by his wisdom; to honor his name and serve his truth and people, that an example and a standard may be set up to the nations."

It is worthy of note that in 1636 the government of Plymouth Colony took decided measures for the promotion of the preaching of the gospel among the Indians; and that in 1644 "the General Court of Massachusetts passed an order 'that the county courts should take care that the Indians residing in their several shires should be civilized, and that they should have power to take order from time to time to have them instructed in the knowledge and worship of God.'" Two years after, "on the 4th of November, 1646, the court ordered and decreed that two ministers should be chosen by the elders of the churches every year, at the court of election, and so to be sent * * * to make known the heavenly counsel of God among the Indians, in most familiar manner, by the help of some able interpreter." "The General Court of Massachusetts," says Palfrey, "was thus the first missionary society in the history of Protestant Christianity."

The history of the missionary labors for the gathering in of the tribes of American Indians is an interesting and important part of the history of missions in the world; and it has a special importance in the history of the growth and expansion of the real missionary spirit in the American churches. It was the providential training by which they were to be fitted for the part that they have already borne in the wider missionary work of the present century, and for their share in the still more enlarged work that is calling forth the zeal and energy of the followers of Christ in both America and Europe at the present day.

The history began with the first landing of the English in 1606, and is still continued. It would be impossible in any narrow limits to give even an outline of the work thus carried on, or to tell of the heroism and faith of the devoted servants of the Lord in various portions of the wide Indian field. They were, as they needed to be, men that could not be deterred by difficulties. They have, from the earlier days of the work, had strongly opposing influences. There was opposition from those who sought to turn to their own advantage the ignorance and degradation of the tribes, and saw, in the progress of the gospel, with its elevating and purifying influences, the spoiling of a traffic that was already bringing them much profit, or from which they hoped for large gains by and by. David Brainerd, in 1746, said: "There are some in all parts of the country, where I have preached to them, who have taken pains industriously to bind them down in pagan darkness; neglecting to enter into the kingdom of God themselves, and laboring to hinder others." "The Indians, who have been my hearers in New Jersey, have likewise been sued for debt, and threatened with imprisonment, more since I came among them, as they inform me, than in *seven* years before. The reason of this, I suppose, was, they left frequenting those *tippling-houses* where they used to consume most of what they gained by hunting and other means. And these persons, seeing that the hope of future gain was lost, were resolved to make sure of what they could. And perhaps some of them put the Indians to trouble purely out of spite at their embracing Christianity."

There were also serious hindrances from the fierce wars that arose between the tribes from time to time, or from the conflicts that often broke out between them and the white settlers, whose growth was continually pressing them back from their old hunting-grounds toward the setting sun. But despite of all adverse influences, men guided of God for the service have continually followed in the footsteps of the dwindling tribes as they have been moving farther and farther westward, earnestly seeking if by any means they might save some of them. At the present time the work goes on. At no time in the history of the country has there been a larger or more determined and influential number of Christian men and women banded together in Christian effort to secure to the Indian tribes the blessings of education and American citizenship, with all of its advantages and responsibilities; and bring them to enjoy a higher dignity as fellow-citizens with the saints and of the household of God. They are thus seeking the same end which so many of the pioneers in American colonization sought two and a half centuries ago.

While the country was yet new, and the situation of the aboriginal tribes immediately around them called for special attention, there was, of course, little thought of the evangelization of Asia and Africa and the isles of the sea. There were, however, movements in the earlier half of the last century that betokened an awakening to the import and obligation of the great commission. In October, 1744, a number of ministers in Scotland were led to recommend special stated prayer to God that he would "deliver all nations from their great and manifold spiritual calamities and miseries, and bless them with the unspeakable benefits of the kingdom of our glorious Redeemer, and *fill the whole earth with his glory.*" The time suggested for such "united extraordinary" supplication was the Saturday evening and the Lord's Day morning, and the first Tuesday of each quarter, beginning with the first Tuesday of November, and continuing for two years. After the two years were ended, a memorial was prepared proposing to continue this method of united prayer. Jonathan Edwards said that "five hundred copies were sent over to New England, directed to be distributed in almost every county in this province of the Massachusetts Bay, and also in several parts of Connecticut, New Hampshire, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Virginia, Carolina, and Georgia."

In 1747 Jonathan Edwards preached a series of sermons which, in the following year, were issued in Boston as his work, entitled *An Humble Attempt to Promote Explicit Agreement and Visible Union of God's People in Extraordinary Prayer for the Revival of Religion and the Advancement of God's Kingdom on Earth.* It was hailed with great pleasure by many godly people, and led out their thoughts more and more to the wide uncultivated fields of earth, and called forth prayer for laborers to enter them and work therein.

There was not at that time much that the Christians of America could do, for they were comparatively few in number, and widely separated from the continents where the most of the heathen nations and tribes dwelt. In the half century from 1800 to 1850 the members of Protestant churches in this country had increased nearly tenfold. In the former year they are reported as 364,875. If the increase from 1750 to 1800 was in the same ratio, then in 1750 there were less than 40,000 in the country; yet, allowing for the disorganizing effects of war, more might be reckoned.

The expenses of transportation to India were at that time very different from what they are at present. The modern facilities of travel were unknown. Even in the year 1793, when William Carey sailed from England in a Danish East Indiaman, the cost was £100 for a passenger. Already in 1774 there had been made in New England a proposal to engage in missionary work in Africa. Dr. Ezra Stiles and Ezra Hopkins proposed to the Presbyterian Synod that measures should be taken to send two native Africans, who had been converted in this land, "on a mission to propagate Christianity in their country." The synod conveyed to the movers of the plan their approval of it, and resolved, "We are ready to do all that is proper for us in our station for their encouragement and assistance." There were, of course, discussions as to the manner in which the plan should be carried into effect. Arrangements were made for the co-operation of American and Scotch Presbyterians and American Congregationalists. The outbreak of the Revolutionary war, however, before the two proposed missionaries were prepared to sail, put an end to the effort. In this case it was proposed only to send out two missionaries, but evidently the synod did not feel prepared to carry on alone even this comparatively small work. Yet about fifteen years previous, it is stated that the Presbyterians were much more numerous in New York, New Jersey, and Pennsylvania than the Baptists, the Church of England, the Dutch Reformed, the French Protestants, the Independents, and the Lutherans combined.

The Revolutionary war was for several years a hindrance to all missionary work, whether home or foreign; and the country was just beginning to recover from the losses and expenses which it entailed when, in 1807 and 1808, the American "Embargo Act," the British "Orders in Council," and Napoleon's "Milan Decree" followed each other in quick succession, and resulted in the almost total ruin of the commerce of the United States. Then came the war of 1812 with

Great Britain, with all of its evil consequences, so that general, concerted, and liberal action for foreign missionary work was delayed. But there was a movement going on in the hearts of many, a fitting preparation for a day rapidly approaching. The work had begun in India in 1793. At the opening of the century William Carey and his associate missionaries settled down at Serampore, which has since become renowned as a radiant centre of Bible light. The words of a British author of the present day are an impartial eulogium on the work that was carried on there: "We are now able to see that this mission may be said to have saved India to the British Empire. It not only created the scholars to whom we have referred, and the band of holy pioneers and heralds, but also the sagacity of Lord Lawrence and the consecrated courage of Sir Henry Havelock. We are therefore prepared to maintain that we are indebted more to William Carey and his £13 2*s.* 6*d.* (the first subscription to the society) than to the cunning of Clive and the rapacity of Warren Hastings."

Reports of the progress of the mission at Serampore when they reached this country aroused deep interest, and numerous contributions were forwarded to aid the work. Soon after, in 1802, The Massachusetts Baptist Missionary Society was organized. Its constitution said: "The objects of this society shall be to furnish occasional preaching, and to promote the knowledge of evangelic truth in the new settlements of the United States; or further, if circumstances should render it proper."

The missionary spirit began speedily to manifest itself in practical ways. *The Massachusetts Missionary Magazine* and *The Massachusetts Baptists' Missionary Magazine* were started in 1803. In 1807, Samuel J. Mills, Gordon Hall, and James Richards, at Williamstown, beside a haystack in the open field, spent a day in fasting and prayer, and in earnest converse in regard to missions to the heathen in the East. On Feb. 26, 1809, Claudius Buchanan preached at the meeting of the Church of England Missionary Society his celebrated sermon on "The Star in the East." When published it was widely circulated, and a few months later it reached Adoniram Judson. The reading of this sermon decided him to devote his life and labors to Eastern missionary work. Mills, Judson, and their associates called the attention of the General Association of Massachusetts to the claims of the heathen world, and proffered their services as missionaries. At length the long train of influences and events, which had been pointing to practical results, culminated in the organization, June 29, 1810, of The American Board of Commissioners for Foreign Missions.

The receipts of the board for the year 1811 were not large, only $999.52; but in 1812 they had increased to $13,611.50, and to thrice that sum, $39,949.45, in 1820, the end of the first decade. Its first missionaries, including those who were first introduced to the General Association and one more, were sent out in February, 1812. The praiseworthy example of organized effort for foreign missionary work having thus been set it was soon followed. In 1814, the society now known as "The American Baptist Missionary Union" was organized, and was followed, in 1819, by "The Missionary Society of the Methodist Episcopal Church."

In the early movement for the establishment of this board a member of the Massachusetts legislature objected to it on the ground, "We have not religion enough at home, and cannot afford to send any abroad." A wiser than he replied: "The religion of the Bible is of such a kind that the more you send abroad the more you have at home." Let the record of missionary work for three-fourths of a century testify to the wisdom of the last speaker and justify the liberality of the vast number who have been actuated by his spirit. Table I. shows the number of foreign missionary societies organized during each of seven decades, from 1810 to 1880, with the number of Women's Societies and the receipts of Foreign and Home Missions by decades.

These figures, however, do not present by any means the whole of what has been done for Home Missions. It makes no report of what has been done by State or city associations, by various ecclesiastical bodies, or by individual churches. It presents no view of the cost of our Sunday-school missionaries and our Sunday-schools, with their 7,000,000 scholars. It leaves out the work of our Bible and publication societies, with their colporteur agencies. The aggregate of the receipts of our Christian publishing societies, of which probably fully one-half belongs to Home Missions, from 1790 to 1880 were $109,483,436. It is only necessary to glance at these figures to see that efforts for the promotion of Christianity abroad do not retard but rather stimulate its advancement at home. Other results of these increasing efforts in Home Missions appear from the proportion of members of evangelical churches to the total population as given by Dr. Dorchester. In 1800 there was one in 14.57 inhabitants, but in 1880 one in every five.

How largely the work of Foreign Missions has developed and how widely it now extends may be seen by Tables II. and III., prepared by Dr. R. Grundemann, in the *Allgemeine Missions-Zeitschrift* for September and October, 1885, published by Dr. Gustav Warneck at Gütersloh, Germany. The complete tables occupy over 20 pages in the *Zeitschrift*. We extract the summary of the work performed in different countries, and that performed by each of the 28 American societies enumerated. The exhibit is for the year 1884, but is by no means complete. The figures in parentheses beneath certain others are such as ought either probably or certainly to be added with those above as corrections. (G. W. A.)

Of the missionary societies named in the table some are simply committees appointed by the ruling body of the denomination which they represent, and to which they make their annual reports; others are entirely voluntary, and make their report to the religious public which supports them. In the women's societies, which have originated within the last twenty years, the entire directorate sometimes consists of women. They have proved most valuable helps in the general work, and have contributed much to reach and elevate the heathen of their own sex.

For the raising of the necessary revenue and increasing the missionary spirit associations are frequently formed in congregations, and in most congregations collections are regularly taken up for missions. The general rate of contribution is not as high as it should be, yet it appears to be steadily increasing, as information concerning the work and its results is spread among the people. Special donations and legacies are acknowledged in nearly every report of the various societies, and are sometimes quite large. Nearly every denomination and society has its periodical, usually monthly, giving information of the progress of its own work, and occasionally an outlook upon the general field.

There are in the United States no special training colleges for missionaries, it being felt that the usual means for supplying ministers at home will furnish sufficient also for the foreign field. At the present time those who enter on the work have generally the advantage of the experience of others in the same field. The work of the missionaries consists in nearly every case of three departments—preaching, circulating the Scriptures, and educating the young. In many places medical missions have been established, and have effectually opened the way for teaching Christianity. Industrial training has also been found necessary for raising the heathen from their degraded state. At times famines in mission fields have led to the establishment of orphanages. Efforts are constantly directed to the training of native helpers for the dissem-

TABLE I.—*Growth of American Missionary Societies.*

	1810–20.	1820–30.	1830–40.	1840–50.	1850–60.	1860–70.	1870–80.	Total.
Foreign Mission Societies organized..	3	....	5	4	2	3	7	24
Women's For. Miss. Societies " ..	....	....	....	....	....	3	18	21
Foreign Mission receipts..................	$206,210	$745,718	$2,885,839	$5,087,922	$8,427,715	$12,929,715	$24,861,482	$57,628,946
Home Mission receipts.....................	....	233,826	2,342,712	3,062,354	8,080,109	21,015,719	31,272,154	72,276,801

TABLE II.—*General View of American Protestant Missions.*

Mission fields.	Stations.	Missionaries.		Adherents.	Communicants.	Baptized in 1883.	Schools.	Scholars.		Total expenditures.
		American.	Native helpers.					Total.	Girls.	
Africa...	79	65	405	22,625 (11,760)	6,725	810	183 (29)	10,256	3,372 (1,750)	$139,215.60
Asia..	240 (3)	463	3,086	276,453 (138,231)	91,441	8,503	2,498 (450)	90,247	31,593 (22,487)	1,540,741.20
Polynesia..	5	15	90	23,481 (13,800)	9,681	403	34 (30)	1,958	909 (900)	27,316.64
America...	111 (25)	120 (2)	284 (5)	37,639 (24,261)	14,478 (1,254)	830	191 (104)	8,667 (1,000)	1,580 (1,315)	202,217.04
Total..	435 (28)	663 (2)	3,865 (5)	360,198 (188,052)	122,325 (1,254)	10,546	2,906 (613)	111,128 (1,000)	37,454 (26,452)	$1,909,490.48

TABLE III.—*General View of Work of American Missionary Societies.*

Mission Societies.	Organized.	Stations.	Missionaries.		Number of adherents.	Communicants.	Baptized in 1883.	Schools.	Scholars.		Expenditures.
			American.	Native helpers.					Total.	Girls.	
American Board C. F. M...............	1810	72	146	1,498	83,630 (29,411)	26,107	1,687	948 (60)	37,458	14,764 (13,235)	$457,545.12
American Baptist Mission Union....	1814	42	82	814	157,549 (103,900)	53,649	2,458	494	13,168	4,850 (2,992)	295,484.88
Methodist Episcopal....	1819	90	90	376	21,474 (4,100)	8,750	2,172	473	17,412	5,300 (5,300)	220,951.68
Protestant Episcopal.....................	1835	45	54	177	5,540 (2,600)	1,664 (400)	169	77 (20)	2,267 (650)	820 (820)	162,474.48
Free-Will Baptists........................	1836	9	5	15	2,709	551	6	50 (50)	3,089	1,000 (1,000)	13,823.04
Presbyterian	1837	70	133	284	24,120 (14,100)	10,020	812	343 (328)	17,627 (250)	5,120	490,717.20
Evangelical Lutheran Gen. Synod..	1839	5	5	57	8,802	3,051	344	122 (20)	3,136	864 (600)	21,984.72
Seventh-Day Baptists....................	1842	1	1	5	62 (30)	32	2	[illegible]	54	9	6,552.96
Southern Baptist Convention.........	1845	12	20	24	5,722 (4,100)	2,135 (544)	52	19 (19)	573 (100)	145 (145)	27,747.84 (720.00)
Southern Methodists.....................	1845	12 (9)	19	117	13,308 (8,291)	5,017	407	24	801	238 (50)	50,545.92
American Mission Association........	1846	11 (10)	13	38	1,085 (500)	395	?	52 (12)	2,220	70 (70)	32,520.96
United Brethren in Christ.............	1853	3	6	24	1,244 (800)	444	82	15 (15)	331	100 (100)	18,376.32
Reformed Church, Dutch..............	1857	11	20	72	7,546 (700)	3,052	198	75	2,198	507 (507)	77,781.12
United Presbyterian......................	1858	13	17	226	15,348 (12,700)	2,648	1,129	95	6,834	2,135 (700)	65,232.00
Reformed Presbyterian..................	1859	2 (2)	5	43	330 (200)	130	16	15 (15)	648	200 (200)	12,384.00
Presbyterian South........................	1862	10	17	21	4,324 (3,150)	1,174	20	14	207	44	23,290.80
German Evangelical Synod...........	1861	4	4	10	375 (200)	175	28	3 (3)	110	30 (30)	4,053.12
Evangelical Lutheran Gen. Council.	1869	4	4	45	1,000	300	220	13	230	70 (70)	8,197.44
For. Chr. Miss. Socy., Disc. of Christ	1875	1	5	....	831	831	....	....	....	....	7,872.00
Cumberland Presbyterian.............	1876	5 (5)	6	....	2,250 (1,500)	750	....	....	....	....	17,198.40
Evangelical Association.................	1876	1	2	4	296 (150)	146	....	4 (4)	132	50 (50)	8,264.64
Methodist Protestant....................	1878	1	1	....	....	....	....	1	44	....	1,461.12
African Methodist Episcopal..........	1878	1	1	7	1,753 (1,100)	653	....	19 (19)	730	250 (250)	3,132.48
African Methodist Zion Church.....	......	......	......	....	200	200					
Associate Reformed Synod, South...	1878	1	1	2	101	50	....	....	....	....	1,008.96
Gen. Conference of Mennonites......	......	2	2	....	....	....	....	1	40	....	1,949.76
Reformed Presbyterian Gen. Synod.	1881	1	1	....	79	79	....	20 (20)	749	542	4,800.00 (4,800.00)
Friends' Mission...........................	1775	3 (2)	3 (2)	6 (5)	520 (520)	322 (310)	144	28 (28)	1,070	340 (340)	7,200.00 (7,200.00)
Total..................................	......	435 (28)	663 (2)	3,865 (5)	360,198 (188,052)	122,325 (1,254)	10,546	2,907 (613)	111,128 (1,000)	37,448 (26,459)	$2,042,450.96 (12,720.00)

(G. W. A.)

ination of the gospel. In recent years considerable attention has been given to the raising up of self-supporting native churches.

Among the fields in which American missions have been especially successful may be mentioned Burmah, where Adoniram Judson labored with apostolic zeal; the Sandwich Islands, which have been raised to a recognized rank among the civilized nations of the world by the labors of the missionaries of the American Board; and Japan, whose recent social revolution is almost entirely due to American missionaries of various denominations. In Mohammedan countries, too, from Armenia to Egypt, in Constantinople, Alexandria, and Beyrout, there are conspicuous evidences of the labors of American missionaries. Many parts of the Dark Continent have already been made centres of light, and the opening up of the great Congo River gives promise of the Christianization of that mysterious region.

Americans who seek further proofs of the immediate utility of missions may well be reminded that to an American missionary, Dr. Marcus Whitman, the United States owe their possession of a foothold on the Pacific coast. The contributions of American missionaries to all departments of science and human well-being have been well summed up by Rev. Thomas Laurie, D. D., in *The Ely Volume* (Boston, 1881). Geography, geology, meteorology, philology, archæology, ethnography, medical science, commerce, and the arts have all been benefited by the observations and studies of those who went to remote places of the world to spread the glorious gospel of the Son of God.

The number of American missionary societies is due to the number of Protestant denominations, yet this diversity of origin has not prevented a notable friendliness and harmony among the laborers. The societies, indeed, have usually taken care amicably to divide the great field, and not to send men to work in fields already occupied by other churches. When, too, the workers have come into actual contact, they have found the differences which separate their denominations at home dwindle into insignificance in view of the great system of Christian faith and practice which they hold and teach in common. In some instances the representatives of two or more denominations have united in forming Christian churches on a union basis adapted to the needs of the community in which they are laboring.

MISSIONS, ROMAN CATHOLIC, OF AMERICA. See ROMAN CATHOLIC CHURCH.

See Vol. XVI. p. 544 Am. ed. (p. 521 Edin. ed.).

MISSISSIPPI, one of the Gulf States of the Union, has an area of 46,340 square miles. It was organized as a Territory on April 7, 1798, and was admitted as a State, Dec. 10, 1817, being the seventh State to enter the Union under the Federal Constitution. The population of the State then gradually increased until in 1860 the inhabitants numbered 791,396. The governor of the State in 1861 was John J. Pettus. It had been an object with the people of Mississippi, from the commencement of the anti-slavery agitation, to attach the border States to the extreme South as strongly as possible; or, rather, to make it as much as possible to their interest to resist abolition. The people of the State were divided on the question of secession. But the election of members of the State Convention in December, 1861, was strongly in favor of the secession movement, some of the members of the convention being in favor of immediate and separate secession, and the remaining portion preferring consultation and co-operation with the other slave-holding States. The State Convention organized Jan. 7, 1861, and immediately appointed a committee to prepare and report an ordinance of secession, with a view of establishing a new confederacy to be composed of the seceded States; the report of this committee was adopted on the 9th of January. The first aggressive movement was made by Gov. Pettus on Jan. 12, 1861, when he ordered a piece of artillery to Vicksburg to stop for examination boats passing on the Mississippi. The entire male population of the State seemed to be willing to take up arms upon the call for troops by the Confederate government, and as early as May 14 notice was given that a sufficient number of companies to fill any probable requisition for troops to be made by the government of the Confederate States on the State of Mississippi had been tendered, and no more companies would be received until a further call should be made. One requisition for 5 regiments was filled in 6 days. This ardent and warlike spirit was manifested by the Mississippi troops throughout the entire period of the rebellion. The State remained under military government after the close of the war until it was readmitted into the Union. The bill for the readmission of Mississippi was introduced into Congress Feb. 12, 1870, and became a law on Feb. 17. During the past fifteen years the State has largely increased in population and wealth, and for several years has ranked as one of the leading cotton-producing States in the Union.

According to the U. S. census of 1880 the white population numbered 479,398 and the colored 652,199, including 1857 Indians and 51 Chinese. There were 24.4 inhabitants to the square mile. The number of dwellings was 208,297; persons to a dwelling, 5.43; number of families, 215,055; persons to a family, 5.26. The voting population was as follows: native-born whites, 102,580; foreign-born, 5674; total whites, 108,254; colored, 130,278.

Education.—The public-school age is from 5 to 21 years. The school population in 1880 was 447,571; number enrolled in public schools, 266,996; average daily attendance, 154.463; average length of school term in the counties, 77½ days; in the cities, 154 days. The following statistical summary shows the general condition of the public schools in 1882 and 1883:

	1882.	1883.
Youth of school age, white......	185,026	180,093
Youth of school age, colored....	259,105	267,478
Whole number of school age....	444,131	447,571
Whites enrolled.....................	104,451	125,598
Colored enrolled.....................	109,630	141,398
Whole enrolment.....................	214,081	266,996
Average daily attendance, white	61,738	68,946
Average daily attendance, colored.....................	73,578	85,517
Whole average daily attendance	135,316	154,463
Average days open in cities......	147	154
Average days open in country..	....	77½
White teachers.....................	2,910	3,598
Colored teachers.....................	2,272	2,803
Whole number of teachers.......	5,182	6,401
Total expenditure.....................	$680,640	$803,876
Amount of available funds......	800,000	
Average monthly pay of teachers	30.03	31.20

There are normal schools at Holly Springs, Iuka, Natchez, Tougaloo, and Oxford. The colleges are: The University of Mississippi, Oxford; Mississippi College, and Rust University (Methodist Episcopal), Holly Springs. There are 11 institutions for the superior instruction of young women. There are 2 agricultural and mechanical colleges, one for whites and one for colored students.

Finances.—The net debt of the State was $331,725 on Jan. 1, 1884, but in addition annual interest is paid on the Chickasaw and common-school funds, which are reckoned at $2,404,566. The State receipts for 1883 were $746,864.75, and the expenditures $745,266.24. The amount raised by taxation was $497,188.08, of which $96,692.97 was from corporations. The taxable property was assessed as follows: real, $87,596,173; personal, $39,158,754. A poll tax of $1 is imposed on the voting population for the benefit of the school fund.

Agriculture and Stock-raising.—Mississippi is one of the leading cotton-producing States in the United States, and is probably outranked only by Texas. The following statement shows the product, etc., of the cereals, potatoes, hay, and cotton in the State in 1884:

Products.	Bushels.	Average per acre.	Number of acres.	Value per bushel, etc.	Total value.
Indian corn..	25,510,000	13 5	1,889,600	$ 0.62	$15,816,200
Wheat.........	238,000	4.9	48,060	1.00	238,000
Rye.............	5,000	6.4	840	1.20	6,000
Oats............	3,048,000	8.8	348,040	.57	1,737,360
Potatoes.......	598,000	72.0	8,305	.87	520,260
Hay, tons....	12,513	1.30	9,625	12.35	154,536
Cotton, bales	883,200	.37	2,392,447	*9.3	39,426,048
Total......	....	....	4,696,917	....	$57,898,404

* Per pound.

The U. S. department of agriculture, on Jan. 1, 1886, estimated the number of animals on farms, average price of each animal, and total value of each kind, for the State, as follows:

Stock.	Number.	Average price.	Total value.
Horses.................	125,154	$69.43	$8,688,875
Mules....................	147,512	88.57	13,064,504
Milch-cows..........	277,523	15.96	4,429,267
Other cattle.........	420,457	9.89	4,158,822
Sheep...................	276,103	1.50	413,878
Hogs.....................	1,212,144	3.04	3,685,645

Since the census year, 1880, there has been an increased interest shown in the breeding of fine stock in all parts of the State. The counties of Noxubee and Oktibbeha are largely engaged in the raising of full-blooded Jerseys, graded Jerseys, full-blooded and graded Durhams and Holsteins, fine jacks and fine breed mares, and Berkshire hogs. The Jersey breed predominates.

Manufactures.—The following summary shows the condition of the principal mechanical and manufacturing industries in Mississippi, according to the census of 1880:

Manufactures.	Establishments.	Capital.	Hands employed.	Total amount paid in wages during the year.	Materials.	Products.
Cotton goods....................................	9	$1,130,640	722	$136,304	$345,649	$691,415
Flouring-mill products.....................	525	889,950	848	96,423	1,535,602	1,762,523
Lumber, sawed..................................	295	922,595	1,170	197,867	1,219,116	1,920,335
Cottonseed oil and cake....................	8	450,000	509	94,860	371,080	560,363
Woollen goods..................................	8	331,500	218	53,100	211,646	299,605
Other industries...............................	634	1,002,915	2,360	614,091	984,090	2,284,061
All industries..........................	1,479	$4,727,600	5,827	$1,192,645	$4,667,183	$7,518,302

Marl and clay are dug in various parts of the State, and in a few places limestone. Thin veins of lignite or brown coal occur in several counties, but they are not mined. Sandstone also occurs, but is not quarried. The mineral springs are numerous, and several of them have considerable reputation beyond the limits of the State. The number of waters used commercially, however, is small.

Railroads.—The length of line open in the State Jan. 1, 1885, was 548 miles, of which 341 miles were operated during 1884; the capital stock was $10,281,978; the funded debt, $9,824,541; the total investment, $20,593,101; the cost of railroad and equipment, $18,365,864. The net earnings of the railroads in 1884 was $313,138; interest paid on bonds, $297,996.

(C. T. D.)

See Vol. XVI. p. 541 Am. ed. (p. 518 Edin. ed.).

MISSISSIPPI RIVER. Of the eight great rivers of the world which exceed 3000 miles in length, three—the Mississippi, 4382 miles in length; the Amazonas or Amazon, 3750 miles; and the Yukon, whose length, though not yet definitely settled, certainly exceeds 3000 miles—belong to the American continent; three—the Nile, the Congo, and the Niger—are on the African continent; while the Yenisei and the Yang-tse-Kiang are the only rivers of Asia whose length gives them rank in this class. The Mississippi, including its great tributary, the Missouri, is the longest, and drains the largest extent of country. Its drainage area, as ascertained by Messrs. Humphreys and Abbott, amounts to 2,455,000 square miles, while that of the Amazonas is but 2,264,000 square miles. It is possible that the Amazonas, which is much wider and has more large tributaries, may bear to the ocean a greater volume of water, though this point can hardly be decided till a more accurate hydrographic survey of the Amazonas has been had.

The following table, compiled by the same eminent authorities, shows in detail the area of the several drainage basins, the amount of annual downfall of each, and the annual drainage:

Basin.	Area, square miles.	Annual downfall in millions of cubic feet.	Annual drainage in millions of cubic feet.
Ohio River..............................	214,000	20,700,000	5,000,000
Missouri River.........................	558,000	25,200,000	3,780,000
Upper Mississippi.....................	169,000	13,800,000	3,300,000
Small tributaries......................	32,400	3,600,000	3,240,000
Arkansas and White Rivers.....	189,000	13,000,000	2,000,000
Red River................................	97,000	8,800,000	1,800,000
Yazoo River.............................	13,850	1,500,000	1,350,000
St. Francis River......................	10,500	1,100,000	9,990,000
Lower Mississippi, exclusive of Red River...........................	1,244,000	78,900,000	18,900,000

Though so much elevated at its source, the Mississippi has comparatively few falls, rapids, or cataracts, and is navigable for nearly 2500 miles. The principal falls and rapids are: The Falls of Pecagama, below the mouth of Leech River, about 20 feet in 300 yards; these form the head of navigation. In the 270 miles from the source of the Mississippi to these falls, the descent had been 324 feet. To the mouth of Pine River, 200 miles below, the rapids and descent amount to 165 feet, but this portion of the river is navigable, except at very low water. The Falls of St. Anthony interrupt the navigation from below, by a reef over which the river makes a plunge of about 18 feet. The Rock Island Rapids of 22 feet fall, 350 miles below, and the Des

Moines Rapids of 24 feet fall, 125 miles below Rock River, are the only other considerable falls of the Mississippi River proper. In its upper course, the Missouri and its affluents have many falls and rapids of great height and beauty.

The Missouri River has two sources, one in the extreme affluents of the Madison River, or rather in a lake of the same name, from which it flows, in 44° 19′ N. lat. and 111° W. long. The Madison River is one of the three forks which, uniting, form the Missouri River. The other source is in the head-waters of the Yellowstone, the largest tributary of the Missouri, and is perhaps quite as distant from its mouth as the other.

The Mississippi has its source in Lake Glazier, south of Lake Itasca, Minnesota, 47° 34′ N. lat., 95° 2′ W. long. The greatest width of this lake is 1½ mile and it is deeper than Itasca, with which it is connected by a shallow stream about 6 feet wide. Not far off is Elbow Lake, one of the feeders of the Red River of the North, whose waters pass through Lake Winnepeg and Hudson's Bay to the Arctic Seas. Similarly, the extreme sources of the Missouri, interlaced with those of the Snake River, one of the affluents of the Columbia, which discharges its waters into the Pacific, and with those of the Green River, one of the constituents of the Colorado of the West, which discharges its waters into the Gulf of California.

The following statistics give further information of this great river :

River.	Distance of source from its mouth. Miles.	Height of source above the sea. Feet.	Width at mouth. Feet.	Downfall of River. Inches.	Mean discharge per second. Cubic feet.
Upper Mississippi (to Missouri River)	1,330	1,680	5,000	35.2	105,000
Missouri	2,908	10,000	3,000	20.9	120,000
Ohio	1,265	1,649	3,000	41.5	158,000
Arkansas	1,514	11,000	1,500	29.3	63,000
Red	1,200	2,450	800	39.0	57,000
Yazoo	500	210	850	46.3	43,000
St. Francis	380	1,150	700	41.1	31,000
Lower Mississippi from lowest large tributary	1,286	416	2,470	30.4	675,000

Other statistics of interest in this connection are : *Breadth* of Mississippi at Traverse Lake, 120 feet; Cass Lake, 172 feet; Falls of St. Anthony, 1200 feet; below Missouri River, 3800 feet; Cairo, 4470 feet; below Arkansas River, 4080 feet; below Red River, 2600 feet. *Depth:* At Itasca Lake, 2 feet; Falls of St. Anthony, 30 to 40 feet; Mouth of Missouri, 80 feet; Mouth of Ohio, 87 feet; Arkansas to Red River, 96 feet; below Red River, 121 feet.

The upper Mississippi has, as we have already seen, a somewhat rapid descent in its course, though navigable above and below the Falls of St. Anthony, but flows in direct lines without many curves or sharp bends between the States of Minnesota, Iowa, and Northern Missouri on the west side, and Wisconsin and Illinois on the east, till it reaches its junction with the Missouri, passing between high bluffs and for a part of its course through dense forests.

At the junction of the Missouri and Mississippi Rivers the former is considerably the larger as well as the longer stream of the two. Above the junction the Mississippi is a clear and pellucid stream, of a slightly brownish tint, while the Missouri pours into it an immense volume of turbid, yellowish water holding in suspension immense quantities of clay, so impalpably fine that it does not readily settle or clear itself. At first the two rivers seem reluctant to unite, the waters of the Missouri continuing entirely distinct from those of the Mississippi, and occupying their own side of the river as far down as St. Louis, 16 miles below the junction.

From this junction to its mouth in the Gulf of Mexico, the Mississippi flows through low alluvial lands, and where there are high bluffs on one side, the other side is sure to be subject to overflow in its times of flood. Its average depth—from 80 to 121 feet at the ordinary stage of the water—is increased by floods at St. Louis, 37 feet; at Cairo, 51 feet; at Carrollton, 14 feet. The stream is always turbid from the finely comminuted clay held in suspension, much of which is not deposited until it reaches the Delta and the Gulf. The current is strong, and above the Red River swift, and as its shores are not rock-bound, but formed of almost impalpable clay and sand, it possesses great excavating power and when its current, in flood, is deflected by any obstacle, it quickly cuts for itself new channels, deserting those in which it once flowed. Owing to these characteristics, the lower Mississippi (from the mouth of the Missouri to its own debouchure into the Gulf) is probably the most crooked river in the world, and its course is constantly changing. In earlier times its curves or loops were regular, comprising almost four-fifths of an ellipse and returning nearly to the same point from which it had departed, so that there were frequently 25 miles of water to be traversed to reach a point, in a direct line, less than a mile distant from the first point of departure. But perhaps, in the next flood, a group of trees which had been washed into the river and become fast in its bed deflected the current and caused it to attack the narrow isthmus and eat it through, and there was a cut-off, and the river was shortened from 6 to 25 miles in that particular bend, while the old channel formed an elliptical lake, having no connection with the river except in time of flood. This might occur in several of these bends in a single season, but it was quite as usual for some object to deflect the current against the opposite bank and cut a new curve or bend there. The trees or buildings undermined and thrown into the river by these constantly changing currents sometimes seriously obstructed the navigation. Occasionally they became the nucleus of islands, which, by constant accretion, attained a considerable size; sometimes, though oftener on the larger affluents of the river, such as the Red River, the Arkansas, etc., they formed rafts, being woven together by the current and extending across the river, while the water flowed under them; these obstructed the navigation and had to be cut away with great labor and expense. One on the Red River, a few years ago, was said to have extended for thirty-five miles, completely blocking the navigation of the river and constantly increasing in length. It was removed at a great expense and by long-continued labor, in cutting away the attachments to the shores. Where the obstructions were of smaller extent they were known as snags and sawyers, and were removed by vessels and machines constructed for the purpose.

Alluvions.—Along the whole course of the lower Mississippi, and, indeed, for 40 or 50 miles above the mouth of the Missouri, there are extensive alluvial beds on both sides of the river, the results of its overflow, forming what are known as "river bottoms," on the valley of the Mississippi proper. These lands are from 6 to 40 miles in breadth. One of these, the "American Bottom," on the Illinois side, extends from the mouth of the Missouri nearly 100 miles southward, with an average width of six miles. The alluvions from the mouth of the St. Francis to the Gulf of Mexico are about 600 miles in length and of an average breadth of 60 miles. They are mostly on the west side of the river. There is also the great Yazoo Basin on the east side, 360 miles long and 60 miles wide. This is perhaps the most fertile tract along the whole shores of the Mississippi. All these bottom lands had been subject to yearly overflow, and the swift currents had cut through them new channels, by which a large part of the waters of the river were drained into the Gulf. These alluvial deposits have a depth of from 25 to 60 feet, and form an exceedingly fertile soil.

Levees.—To reclaim these overflowed lands and restrain the great river within narrower bounds, where, with a deeper and swifter current, it might sweep these clay deposits into the delta, it was found necessary to erect barriers along its banks. These barriers, when erected, with sides sloping in each direction, and strengthened by piles and bags of sand placed between the rows of piles, are known as *levees.* The first levees on the banks of the Mississippi were commenced at New Orleans in 1720. The first one constructed was 4 feet in height, 18 feet wide across the top, and 5400 feet in length. Very little was done in extending or strengthening this levee for the next 80 years; but after the cession of the Louisiana territory to the United States, in 1803, it was commenced in good earnest. The levees now extend 70 miles below New Orleans and 1000 miles above on the Mississippi River, while there are also extensive levees on the Yazoo, Arkansas, Red, and other rivers, and on the Lafourche, Atchafalaya, Teche, and other bayous and lakes formed by the cut-offs. The burden of their maintenance and repair, borne at first by riparian proprietors, later by counties or parishes, and later still by the States interested, has weighed so heavily upon them as to become intolerable, and they have appealed very urgently to the U. S. government for help. The floods are so violent and destructive, the pressure on the levees of the river, when brimming full, is so great, and the levees, in their best estate. are so largely composed of this fine clay *detritus*, that the annual repairs average $2,000,000. The State of Louisiana alone has built 75,000,000 cubic yards of earthwork in its 780 miles of river front, and much of this has had to be rebuilt and strengthened annually at a very heavy cost. The U. S. engineers appointed to investigate and report upon a system of levees to be constructed by the government, reported that 1785 miles were necessary to protect the alluvial lands from overflow, and about 925 miles more for the interior rivers, bayous, and old river lakes in Louisiana. The latter, however, would be more appropriately constructed by the State. They estimated that these levees would cost $36,000,000 for their proper and substantial construction, and that $2,000,000 more would be needed annually to keep them in perfect repair. By the construction of these levees, from 10,500,000 to 12,000,000 acres of the richest alluvial lands in the world would be permanently reclaimed. Another argument for the construction of these levees by the general government, which possesses considerable force, is that if the river is restrained between its banks, and outlets prevented, the force of its current will be greatly increased, and the sediment hitherto deposited in the river bed, now averaging from 50 to 100 feet of depth, will be carried forward by the swift current and deposited in the delta, instead of raising the level of the waters in the river higher than that of the adjacent country; so that, while now the surface of the river at New Orleans is several feet above that of the lands adjacent to the levees, which alone protect it from overflow, if the whole banks of the lower Mississippi were protected by levees, while the volume of water discharged would be considerably increased, the river would be much deeper, and, with a swifter current, it would bear the suspended *detritus* to the lower delta and extend the new-made lands still further into the Gulf. The *jetties* (see JETTIES) constructed by Capt. Eads and others at the passes have had the effect of deepening the channels through those passages to 35 feet in one case, and thus supplementing the action of the levees. By means of the two in combination the channel will be kept clear and navigation will be unimpeded to St. Anthony's Falls on the upper Mississippi.

Like all great rivers, the Mississippi expands at its mouth into a broad tract of land in the formative stage, from the deposits of sand and clay brought down by its vast discharge of water. Through this delta, whose entire area is estimated at 38,600 square miles, the great bulk of its waters is discharged by several passes. Of these five or six passes, four are especially noteworthy; these are the South, the South-west, the North-east, and the Barataria Pass. These passes have been clogged by bars of the silt and sand brought down by the river till the channels would admit only vessels drawing from 6 to 9 feet. The South Pass has now been deepened to about 35 feet. Through these channels there are discharged annually about 19,500,000,000,000 cubic feet, equal to 145.6 cubic miles of water into the Gulf of Mexico.

The following table gives the most important particulars in regard to the three principal passes at the mouth of the Mississippi, at three different dates. It is compiled from the reports of the engineers:

Comparative Dimensions of Passes of Mississippi River in 1850.

	Width.	Mean depth. Feet.	Section.	Discharge. Feet per second.
South-west Pass...........	1,677	41.8	73,142	342,692
North-east Pass...........	1,440	51.0	76,360	467,571
South Pass..................	900	15.0	12,960	80,761

Measurements of Capts. Talcott, Forshey, and Howell in 1838, 1850, *and* 1874.

	Per cent. whole river.	Per cent.	Per cent.	Cross-section.
	1838.	1850.	1874.	1874.
South-west Pass...........	.40	.45	.36	59,422
South Pass..................	.09	.08	.15	24,774
North-east Pass...........	.52	.47	.50	82,937
	Talcott.	Forshey.	Howell.	Howell.

The aluminous clays held in suspension by the waters are so finely comminuted that they are borne out many miles into the Gulf. The blue mud characteristic of these deposits is found in soundings from 50 to 100 miles from land, along the whole delta front of 120 miles and not less than 200 miles both east and west.

(L. P. B.)

See Vol. XVI. p. 547 Am. ed. (p. 524 Edin. ed.).

MISSOURI, one of the central States of the United States of America. It derives its name from the great river, the Missouri, which flows across the State from east to west and divides it into a northern and a southern section, the latter comprising more than two-thirds the entire area of the State, which is 68,735 square miles according to the U. S. census of 1880. This great tract was a portion of the vast territory, commonly called Louisiana, which came into the possession of France through claimed original discovery and settlement. In 1762 France ceded to Spain all her possessions west of the Mississippi River, and in 1800 the same territory was retroceded by Spain to France, who in 1803 sold it to the United States of America. Congress then divided the purchase into the Territory of Orleans and the District of Louisiana, which latter in 1805 was made into a Territory. A portion of the Territory of Orleans was admitted into the Union as a State in 1812, and this new State was thenceforward known as Louisiana, and the name of the Territory of Louisiana was then changed to Missouri. The latter was organized as a Territory in June, 1812, the first governor being William Clarke. Missouri applied to Congress in 1818 to be allowed to enter the Union of the States, and after two years of bitter and partisan discussion between the representatives of the Northern and Southern States—the former opposing the admission of another slave State into the Union—Missouri was finally, in 1820, admitted into the Union as a State

UNITED WE STAND DIVIDED WE FALL
SALUS POPULI SUPREMA LEX ESTO
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under the terms of a solemn agreement that slavery should be forever excluded from all that part of the Louisiana purchase lying north of lat. 36° 30′, except in Missouri. This compact is known as the "Missouri Compromise." The admission of Missouri, which was the eleventh State to enter the union under the Federal Constitution, was consummated by Presidential proclamation dated Aug. 10, 1821. From 70,647 inhabitants in 1821, the population increased to 1,182,012 in 1860. In the various Indian wars and in the war with Mexico the State furnished its full quota of volunteers. In the Kansas war of 1854 the citizens of the western border took an active part against the Free State movement. The governor and legislature in 1861 were avowedly in favor of committing the State to the secession movement, but an ordinance of secession was not passed, as the public sentiment was prompt to manifest itself in opposition to this scheme. In his inaugural address, Jan. 4, 1861, Gov. Jackson recommended the calling of a State convention to ascertain the will of the people, and the State senate, on Jan. 16, 1861, passed a bill authorizing the holding of such a convention. The members elected to this convention met at Jefferson City on Feb. 28, and after organizing adjourned to meet at St. Louis on March 4, when Mr. Glenn, the commissioner from Georgia, strongly urged Missouri to join the State which he represented in the formation of a Southern Confederacy, but by a vote taken March 5 Missouri emphatically declined to accede to the wishes of the commissioner from Georgia. On April 20, 1861, the arsenal at Liberty was seized and the arms and cannon were distributed in the county. Gov. Jackson declared his policy at this time to be in favor of peace. He thought, however, that the President in calling out troops to subdue the seceding States threatened civil war, and recommended preparations against aggressions by all assailants. Jackson greatly exceeded his authority in the endeavor to aid the seceding States, and the State convention declared the offices of governor and lieutenant-governor and the seats of the members of the legislature vacant. Missouri soon became the theatre of constant battles and skirmishes between the Federal and Confederate forces. In October, 1861, the Federal force in the State was estimated at 27,000 men, of whom 5000 were under the command of Gen. Hunter, 4000 under Gen. Sigel, 4500 under Gen. Asboth, 5500 under Gen. McKinstry, 4000 under Gen. Pope, 2500 under Gen. Lane, and 1000 under Gen. Sturgis. The Confederate States sent all the force they could spare into Missouri and made a strong contest for the State, the possession of the vast countries which lie to the west and southwest of the State being the motive of their efforts. Could the Federal troops have been driven out of Missouri it doubtless would have settled the destinies of Kansas, the Indian Territory, Arizona, and New Mexico. In addition to the conflicts between the Union and Confederate forces a continuous guerilla warfare was kept up during the entire period of the war in various portions of the State. Public and private property of great value was destroyed by the Confederates and their sympathizers in the State. In February, 1862, the Confederate Gen. Sterling Price was driven from the State, which had seemed for a time to be almost entirely in his power. In 1864 he made an invasion, hoping to rally to his side the secret organization "The Knights of the Golden Circle," of which he was the head, and whose object was the defeat of the Union cause. He was, however, again driven from the State and his schemes defeated.

Since the close of the war of the Rebellion the people of Missouri have devoted their energies to the development of its vast agricultural and mineral resources, and to the improvement of facilities for communication. In addition to the building of railroads by private enterprise, large sums have been expended by the U. S. government upon the improvement of the navigation of the Mississippi, Missouri, and other rivers of the State. According to the U. S. census of 1880 the white population numbered 2,022,826; the colored, 145,554, including 113 Indians and 91 Chinese. The population of the State to the square mile was 31.5; number of dwellings, 369,180; persons to a dwelling, 5.87; number of families, 403,186; persons to a family, 5.38. The voting population was as follows: White native, 396,322; foreign born, 111,843; total white, 508,165; colored, 33,042.

Finances.—The State debt in 1885 was $11,309,000. Its receipts for 1884 were $2,928,356. The expenditures, $2,730,988. Amount raised by taxation, $2,839,523. Amount of taxable property was: real, $496,730,663; personal, $187,145,751. Railroad and telegraph property, $41,898,845; total, $725.775,259. The rate of State tax was 4 mills on $1. There is no capitation tax.

Education.—The public-school age for both the white and colored population is 6 to 20 years. According to the U. S. census of 1880, the total school population was 785,122; number enrolled in public schools, 527,452; average daily attendance, 398,031; average duration of school term, 112.6 days. The following table shows the condition of the schools in 1883–84:

	1883.	1884.
White youth of school age.......	727,412	734,624
Colored youth of school age.....	43,812	43,954
Whole number of school age...	771,224	778,578
White youth in public schools..	487,509	501,321
Colored youth in public schools	23,820	26,131
Whole number enrolled..........	511,329	527,452
Average daily attendance.........	330,411	398,031
Pupils attending private schools	....	10,528
Schools for white youth..........	8,601	8,881
Schools for colored youth.........	497	528
Whole number of schools.........	9,098	9,409
Average school term, in days...	116	113
Whole number of teachers......	12,077	13,296
Whole expenditure................	$3,767,049	$4,288,135
Estimated value of school property	9,289,410	8,825,548
Available school fund............	9,879,066	10,178,806
Average monthly pay of teachers	46.61	47.75

Besides the St. Louis normal school, maintained by that city, the State maintains 6 normal schools: one connected with the State University, Columbia, one with the State College, Rolla, and 3 others for white students, at Kirksville, Warrensburg, and Cape Girardeau. Lincoln Institute, the normal school at Jefferson City, is for the education of colored teachers. There are also normal courses in several colleges. Kansas City, St. Joseph, Sedalia, and St. Louis, all contain public high schools. The University of Missouri, Columbia, gives instruction in 11 academic schools, 6 in science and 5 in languages, and in 9 professional schools, 1 of the latter (the School of Mines and Metallurgy) being at Rolla. The Washington University, St. Louis, gives in its Smith Academy, for young men, and the Mary Institute, for young women, thorough preparatory training for the 3 collegiate courses in arts, philosophy, and science. Free evening schools, preparatory to industrial pursuits, are held in the polytechnic building, also connected with the university. The South-western Baptist College, Bolivar, organized in 1879, gives classical and Latin scientific courses, and a course in letters. Westminster College, Fulton (Presbyterian), gives a classical course of 6 years, a scientific course of 4 years, and a business course. Morrisville College, Morrisville (Methodist Episcopal), chartered as a college in 1876, opened its collegiate department in 1883. Sedalia University, Sedalia (Presbyterian), gives classical, scientific, and modern language courses of 4 years. Most of the above colleges report preparatory training of from 1 to 3 years. Chris tian and St. Louis Universities, and Stewartsville College, have commercial courses. St. Louis University has provided a graduate course.

The law of 1883 regulating the practice of medicine authorizes the State board of health to issue certificates to all who shall furnish satisfactory proof of having received diplomas or licenses from legally chartered medical schools in good standing, of whatever school or system of medicine. There are 9 "regular" medical schools, with courses of from 18 to 34 weeks; 1 eclectic, with a course of 20 weeks; and 1 Homœopathic medical college, with a course of 19 weeks.

Agriculture and Stock Raising.—The following statement shows the product, etc., of the cereals, potatoes, tobacco, and hay in Missouri in 1884:

Products.	Bushels.	Average per acre.	Acres in each crop.	Value per unit of quantity.	Total value.
Indian corn.	197,850,000	33.0	5,995,931	$0.26	$51,441,000
Wheat........	27,500,000	11.8	2,334,766	.62	17,050,000
Rye...........	588,000	11.7	50,054	.50	294,000
Oats...........	30,774,000	26.7	1,152,590	.25	7,693,500
Barley........	178,000	21.6	8,242	.60	106,800
Buckwheat..	70,000	11.7	6,014	.60	42,000
Potatoes.......	6,653,000	85.0	78,275	.33	2,195,490
Tobacco (*a*)..	15,810,000	978.0	16,170	7.6	1,201,560
Hay (*b*).......	1,625,000	1.30	1,250,000	6.30	10,237,500
Total........	....	....	10,892,042	....	$90,261,850

(*a*) Pounds. (*b*) Tons.

The U. S. department of agriculture, on Jan. 1, 1886, estimated the total number of animals on farms in the State, the average price of each animal, and their total value as follows:

Class of animals.	Number.	Average price.	Value.
Horses..	737,208	$58.52	$43,138,118
Mules.........................	212,615	67.76	14,407,602
Milch-cows................	708,698	24.59	17,426,884
Oxen and other cattle..	1,387,818	20.84	28,921,584
Sheep.........................	1,285,078	1.48	1,908,340
Hogs	4,168,091	3.46	14,404,922

Since the U. S. census of 1880 there has been a general movement in the State towards an increase in the number of grazing animals. The rapid decline since 1880 in the value of wheat in all the markets of the world, and the general movement in the State towards higher agriculture through increased grass culture, has naturally been followed by an increase of live stock. The low price of wool, however, during the past few years, has made sheep an exception.

Manufactures.—The following summary shows the condition of the principal mechanical and manufacturing industries in Missouri, according to the U. S. census of 1880:

Mechanical and manufacturing industries.	Establishments.	Capital.	Hands employed.		Wages for the year.	Materials.	Products.
			Males above sixteen.	Females and youths.			
Agricultural implements....................	74	$645,772	713	13	$276,536	$599,015	$1,141,822
Bags, other than paper.......................	3	575,000	90	118	82,000	1,466,000	1,730,000
Boots and shoes................................	26	642,800	864	418	447,663	1,224,796	1,982,993
Bread and other bakery products........	227	864,520	773	163	405,064	2,159,908	3,250,192
Brick and tile....................................	230	989,415	2,271	466	705,975	388,364	1,602,522
Carriages and wagons........................	119	1,054,050	1,557	74	699,892	1,183,478	2,483,738
Cars, railroad, street, and repairs.........	8	424,200	926	50	411,591	1,405,460	1,931,609
Clothing, men's................................	170	1,450,254	1,368	1,694	882,726	2,104,997	3,822,477
Confectionery..................................	46	319,260	234	215	174,574	835,540	1,247,235
Cooperage..	182	609,260	1,227	97	510,654	1,017,617	1,904,822
Cotton goods....................................	4	890,500	123	389	99,080	377,131	524,580
Drugs and chemicals.........................	21	722,450	236	96	130,475	680,545	1,220,211
Fertilizers..	2	108,000	64	[illegible]	36,720	210,000	380,000
Flouring products.............................	872	7,883,675	3,375	1	1,200,493	28,202,782	32,438,831
Foundry and machine-shop products...	97	4,027,163	3,902	42	2,093,224	3,147,187	6,798,832
Furniture..	157	1,178,682	1,387	87	642,476	1,219,165	2,380,563
Furniture, chairs	12	332,063	324	119	146,247	179,167	449,812
Glass..	6	1,430,000	709	256	381,098	351,871	919,827
Gold and silver, reduced and refined...	1	350,000	125	....	67,747	4,038,925	4,158,606
Iron and steel....................................	22	9,152,472	2,989	150	734,575	3,249,558	4,660,530
Iron bolts, nuts, washers, and rivets....	4	235,000	123	14	60,498	301,937	493,560
Leather, curried................................	15	72,500	66	....	22,804	276,034	336,623
Leather, tanned	26	137,850	107	11	43,817	321,805	435,072
Liquors, distilled..............................	20	230,100	54	5	35,338	354,973	527,530
Liquors, malt	64	4,942,700	1,394	108	699,616	2,852,236	5,048,077
Lumber, planed	26	409,350	546	43	245,963	774,442	1,267,636
Lumber, sawed..................................	881	2,867,970	3,408	95	669,644	3,215,292	5,265,617
Marble and stone work......................	115	376,800	697	21	330,011	354,958	1,003,544
Paints	16	1,808,350	563	14	270,532	2,186,480	2,825,860
Patent medicines and compounds........	27	1,402,700	207	105	139,996	502,735	1,197,090
Printing and publishing.....................	131	2,949,660	2,380	417	1,538,564	1,515,048	4,452,962
Pumps	11	530,600	112	2	66,680	703,670	932,550
Saddlery and harness........................	355	1,898,723	1,954	99	793,536	2,345,485	3,976,175
Sash, doors, and blinds.	15	600,795	677	43	279,911	696,671	1,232,670
Slaughtering and meat-packing...........	65	2,327,500	1,743	103	657,918	12,352,907	14,628,630
Soap and candles..............................	19	766,927	273	5	104,061	1,336,376	1,704,941
Sugar and molasses, refined...............	1	840,000	250	2	112,270	4,173,100	4,475,740
Tin, copper, and sheet-iron ware.........	297	656,860	772	80	338,597	864,643	1,687,320
Tobacco, chewing, smoking, and snuff..	43	1,440,200	1,008	746	493,559	4,243,614	5,286,338
Tobacco, cigars and cigarettes............	284	443,562	886	151	424,363	612,393	1,524,381
Vinegar..	20	307,150	145	38	86,420	344,500	675,400
Woollen goods..................................	98	726,150	412	277	109,877	681,711	930,961

The number of blast-furnaces in the State on Jan. 1, 1884, was 17 ; the production of pig-iron in each of the years since 1876 has been as follows :

Year.	Short tons.	Year.	Short tons.
1876	68,223	1881	109,799
1877	73,565	1882	113,644
1878	47,499	1883	103,296
1879	84,637	1884	60,043
1880	105,555		

For the coal measures of Missouri see COAL, Vol. II., p. 200. The following table shows the production from 1873 to 1884 :

Year.	Long tons.	Year.	Long tons.
1873	700,000	1879	900,000
1874	714,000	1880	1,500,000
1875	750,000	1881	1,750,000
1876	900,000	1882	2,000,000
1877	900,000	1883	2,250,000
1878	900,000	1884	2,500,000

Missouri possesses four distinct iron-ore fields, known as the Iron Mountain, the South-eastern, the South-western, and the Western districts. The Iron Mountain district is located in Iron and St. François counties, and lies south about 80 to 90 miles from St. Louis. Iron Mountain and Pilot Knob are the principal deposits of the district. About 3,000,000 tons of ore have been produced since 1845 from Iron Mountain, and about 1,000,000 tons of ore have been derived from Pilot Knob since 1847. In Crawford and Dent counties, in the south-west section, just west of the Iron Mountain district, are numerous mines of rich ore operated by the Missouri Iron Company and by others. Analyses of the ores of this section show metallic iron ranging in every case above 60 per cent., with a very low percentage of phosphorus, little or no sulphur, and variable silica. At Mine la Motte, Madison county, cobalt is found in the form of nearly all the cobalt minerals known.

The low price of copper during the past few years has given but little encouragement for the development of copper mining in Missouri. The Genevieve copper mines, however, continued in operation until 1885. The output of lead in the non-argentiferous districts of the State has been declining for several years owing to the enormous production of lead in Colorado and an increasing supply from Utah. The Saint Joseph Lead Company, at Bonne Terre, has not, however, greatly curtailed its production, and Mine la Motte has had a regular output for some years. These great mines are said in 1886 to look as well as they did in 1880. The following is the estimate of the output of lead in Missouri in 1883–84 :

Districts.	1883. Short tons.	1884. Short tons.
South-eastern Missouri	11,693	14,979
South-western Missouri and Kansas	7,644	17,416
Total	19,337	32,395

Zinc is found in South-west Missouri, the bulk of the ore mined in the State being derived from Jasper and Newton counties. Promising discoveries of deposits of zinc ore have been made in Central Missouri, along the line of the Kansas City, Springfield, and Memphis Railroad. The following statement shows the annual capacity of the Missouri zinc works :

Company.	Place.	Furnaces.	1883. Tons.	1884. Tons.
Missouri Zinc	Carondelet	14 Belgian	4,000	4,000
Glendale Zinc	Carondelet	8 Belgian	3,000	3,000
Carondelet Zinc	Carondelet	4 Belgian	1,000	1,000
South-western Lead and Zinc	Rich Hill	1 Belgian, 1 Siemens	2,250	2,250
West Joplin Lead and Zinc	Joplin	6 Belgian	2,250	2,250
Total			12,500	12,500

Tin has been frequently reported from Missouri, but it is doubtful if it occurs there in any considerable quantity. Wolfram and other tungsten minerals have been obtained from the Einstine silver mines 10 miles west of Fredericktown.

The State is rich in mineral springs, but comparatively few of them have been improved. There was formerly a considerable production of salt in Saline, Saint Genevieve, and Jefferson counties ; but the industry has declined during late years.

Railroads.—On Jan. 1, 1885, the length of line open in the State was 1984 miles ; length of line operated in 1884, 5650 miles ; capital stock, $187,349,104 ; funded debt, $174,648,059 ; total investment, $365,263,131 ; cost of railroad equipment, $318,622,291. Net earnings in 1884, $16,255,707 ; interest paid on bonds, $10,410,580 ; dividend paid on stocks, $3,211,438. (C. T. D.)

MISTRAL, Frédéric, a Provençal poet, was born at Maillane, France, Sept. 8, 1830. He studied at Nyons and Avignon, and was licensed in law. After composing several poems in Provençal, he published in 1859 *Mirèio*, with a French translation. This narrative poem received from the French Academy in 1861 a prize of 2000 francs. It is the basis of Gounod's opera *Mireille*, and has been translated into English by H. Crichton (London, 1868), and Harriet W. Preston (Boston, 1872). Mistral's later publications are *Calendau pouéms nouveau*, with French translation (1867) ; and *Lis Isclo d'or* (Golden Shoes, 1875).

MITCHEL, John (1815–1875), an Irish revolutionist, was born at Dungiven, County Derry, Nov. 3, 1815. He was the son of a Unitarian minister, and graduated at Trinity College, Dublin, in 1836. He became a lawyer and a journalist, and joined in the Young Ireland movement. He afterwards urged more violent measures, and in 1847 started the *United Irishman*. With other leaders he was arrested in 1848, convicted, and sentenced to 14 years' transportation. In 1853 he escaped from Tasmania to New York city, where he started the *Citizen*, but, having strong pro-slavery views, went to Richmond and published the *Southern Citizen*. He afterwards resided in Alabama and at Paris. During the American civil war he edited the Richmond *Enquirer*. He lost two sons in the war. In 1874 he returned to Ireland, and after his return was elected to Parliament from Tipperary. His election was declared void by Parliament on the ground of his not having been pardoned. But he was re-elected in March, 1875. Before the result was laid before Parliament he died at Newry, March 19, 1875. He published *Hugh O'Neill* (1844) ; *Jail Journal, or Five Years in British Prisons* (1854) ; *The Last Conquest of Ireland—Perhaps* (1861). He also edited the *Poems* of Thomas Davis and James C. Mangan, and wrote a continuation of McGeoghegan's *History of Ireland*.

MITCHELL, Donald Grant, an American essayist, was born at Norwich, Conn., April, 1822. His father was a Congregational pastor there, and his grandfather was chief-justice of Connecticut. He graduated at Yale College in 1841, spent three years on a farm, then went to Europe and wandered over Jersey and England on foot. Returning to the United States he studied and practised law at New York. Meantime his contributions to the newspapers and his books made known his assumed name, "Ik Marvel." In 1848 he again visited Europe, and on his return published *The Lorgnette*, a periodical resembling *Salmagundi*. In 1853 he was made U. S. consul at Venice. Since his return to the United States he has resided at a country-seat near New Haven. His first volume was *Fresh Gleanings* (1846), sketches of his travels ; then *The Battle Summer* (1850), personal observations at Paris in 1848. *The Reveries of a Bachelor* (1851), a sentimental volume, obtained popular favor, which was extended to *Dream Life* (1852). In later years several of his books were due to his rural pursuits, the first being *My Farm at Edgewood* (1863). In his next, *Wet Days at Edgewood* (1864), the poetical and literary side of agriculture is reviewed from Hesiod down to recent times. Among his other works are *Doctor Johns* (1866), a novel of New England life and manners; *Rural Studies, with Notes for Country Places* (1867); *About Old Story-tellers* (1875). Mr. Mitchell continues to contribute to the leading American magazines.

MITCHELL, John Kearsley (1798–1858), an American physician, was born at Shepherdstown, Va., May 12, 1798. He was educated in Scotland, and studied medicine at the University of Pennsylvania, graduating in 1819. After three years' service as ship's surgeon, he settled in Philadelphia. In 1826 he was made professor of chemistry in the Philadelphia Medical Institute, and in 1833 in the Franklin Institute. In 1841 he was made professor of the theory and practice of medicine at the Jefferson Medical College. He was noted as a practitioner and lecturer. He died at Philadelphia April 4, 1858. He published a volume of poems and some medical essays. (See Hydrophobia.)

His son, Samuel Weir Mitchell, was born at Philadelphia, Feb. 15, 1829. He graduated at Jefferson Medical College in 1850, and gave much attention to toxicology. In later years he devoted himself chiefly to diseases of the nervous system. He has contributed numerous articles to medical journals on poisons and various diseases. He has published, with others, *Gunshot Wounds and Other Injuries to the Nerves* (1864) and *Injuries to the Nerves and their Consequences* (1871). He has also published *The Hill of Stones* (1883) and *In War Time*, a novel (1884).

MITCHELL, Maria, an American astronomer, was born at Nantucket, Aug. 1, 1818, of Quaker family. Her father was a schoolmaster, with a fondness for astronomy, and from him she acquired the rudiments of that science. She became an expert observer, and on Oct. 1, 1847, discovered a telescopic comet, for which she received a gold medal from the king of Denmark. She visited the principal observatories of Europe in 1857, and on her return was presented with a well-equipped observatory, which her friends had provided in her absence. She was the first female member of the American Academy of Arts and Sciences. In 1865 she was made professor of astronomy in Vassar College, Poughkeepsie, N. Y.

MITCHILL, Samuel Latham (1764–1831), an American physician and author, was born at North Hampstead, Long Island, Aug. 20, 1764. He was the son of a Quaker farmer, and studied medicine both at New York and Edinburgh, graduating in 1786. He also studied law, and in 1790 was elected to the New York legislature. In 1792 he was made professor of chemistry and natural philosophy in Columbia College, New York. He introduced the nomenclature of Lavoisier, and, having expressed his dissent from some of that chemist's principles, became involved in a controversy with Dr. Priestley. The result, however, was mutual esteem and a long friendship. In 1793 Dr. Mitchill assisted in forming the Society for the Promotion of Agriculture, Manufactures, and the Useful Arts. He also joined in 1797 in founding the *Medical Repository*, which he edited for sixteen years. In 1801 he was elected to Congress. In 1804 he was made a U. S. Senator, and on the expiration of his term was again elected a representative. He was professor of botany and materia medica in the New York College of Physicians and Surgeons from 1820 to 1826, when he resigned and took part in forming the Rutgers Medical School. Throughout his career he was active in scientific, literary, and political labors. He was a pleasant, humorous speaker, with a dash of eccentricity, which gave scope for the wits of the time. One of his noted publications was *An Address to the Fredes or People of the United States* (1804), in which he urged the adoption of "Fredonia" as the name of this country. A noted address was his *Life, Exploits, and Precepts of Tammany, the Famous Indian Chief* (1795). His serious publications related to natural history, geology, and chemistry. He died at New York, Sept. 7, 1831. Dr. John W. Francis published *Reminiscences of S. L. Mitchill* (1859).

MIVART, St. George, an English naturalist, was born at London, Nov. 30, 1827. He was educated at Harrow, at King's College, London, and at St. Mary's, Oscott, having become a Roman Catholic. He was called to the bar in 1851, but devoted himself chiefly to scientific pursuits. He became lecturer in a medical school in 1862, and professor of biology in University College, Kensington, in 1874. He has accepted the doctrine of evolution, but denies that it extends to the human intellect. Besides numerous contributions to scientific periodicals he has published *Genesis of Species* (1871); *Elementary Anatomy* (1872); *Man and Apes* (1873); *Contemporary Evolution* (1876); *Lessons from Nature* (1876).

MOBERLY, George (1803–1885), an English bishop, was born in 1803 at St. Petersburg, Russia, where his father was residing as a merchant. He was educated at Winchester and at Balliol College, Oxford, graduating in 1825, and becoming a tutor and fellow of his college. In 1835 he was made a head master of Winchester School, and held this place till 1866, when he became rector of Brighstone. In 1868 he was made canon of Chester, and in 1869 bishop of Salisbury. He died July 4, 1885. Among his publications are *Introduction to Logic* (1838); *The Sayings of the Great Forty Days* (1844; 5th ed., 1875); *Sermons Preached at Winchester College* (1844); *Studies and Discipline of Public Schools* (1861); *The Administration of the Holy Spirit in the Body of Christ* (1868); *Brighstone Sermons* (1869–74). Bishop Moberly took special interest in the revision of the New Testament, being one of the "five clergymen" who published revised versions of several epistles.

MOBERLY, a city of Missouri, county-seat of Randolph county, is at an important junction of several railway lines, 146 miles W. N. W. of St. Louis. It stands in a fertile and level region, rich in coal, the working of which is a leading pursuit. The town has 6 hotels, 3 banks, a high-school, 2 daily and 3 weekly newspapers, 8 churches, rope-walks, foundries, and extensive railway car- and machine-shops. It is lighted with gas, and has city water-works and a public park. Valuation, $1,200,000; public debt, $106,000. It was founded in 1866, and incorporated in 1868. Population in 1870, 1514; in 1880, 6070; since much increased.

MOBILE, the county-seat of Mobile county, the largest city and only sea-port of Alabama, is beautifully situated on a broad, sandy plain, stretching westward from the mouth of the river and head of the bay of the same name to a range of well-timbered hills, which, in about 6 miles from the water's edge, reach an altitude of 300 feet. Mobile is in 30° 41′ 28″ N. lat., 87° 59′ W. long., and is 140 miles E. N. E. of New Orleans and 33 miles N. from the Gulf of Mexico. By the Louisville and Nashville and by the Mobile and Ohio Railroads it has direct connection with the principal cities of the South and West. The Grand Trunk Railroad has been built a distance of 57 miles north, and is designed to traverse the rich agricultural lands of West Alabama. The principal public buildings are the custom-house, a granite structure, erected in 1859, which provides accommodations also for the post-office and U. S. court; the county court-house was completed 1870; Borton Academy, 1837; medical college, 1859; city hospital, 1830; marine hospital, 1836; municipal buildings and market-house, 1857; cotton exchange, 1885. The most imposing church edifices are the Cathedral of the Immaculate Conception (Catholic), Christ Church and St. John's (Episcopal), the Government Street, Presbyterian, and

St. Francis Street, Baptist; besides which there are 8 other Catholic churches, 3 Episcopal, 2 Presbyterian, 8 Methodist, 5 Baptist, 1 German Lutheran, and a Jewish synagogue. Among the charitable establishments are a Catholic and a Protestant orphan asylum and a church home. There are 5 hotels, 3 weekly, 1 morning, and 1 evening newspaper. The financial facilities comprise 2 national, 2 savings, and 2 private banks, while there are 8 fire and 2 life insurance companies. The public schools (free) have an average daily attendance of 4025, of which 1500 are colored; besides which there are a number of private schools. The College of St. Joseph, at Spring Hill, under the Jesuits, and the Academy of the Visitation, in the suburbs, are well attended. The educational fund annually dispensed in the city slightly exceeds $50,000, and gives free and thorough instruction to over 4000 boys and girls. Within the corporate limits are 2 cotton, 6 grist- and 1 cottonseed-oil-mill, 1 barrel- and 1 box-factory, 3 foundries and boiler-works, a harness-factory, a tannery, and a manufacturer of Toulon chewing-gum. The lumber interests are represented by 7 mills, with a daily capacity of 230,000 feet, 4 shingle mills, with a daily production of 175,000, and 2 sash, door, and blind-factories. Very near and tributary are 21 other saw-mills and 3 shingle-mills. A floating dry-dock and 2 marine ways offer all needed facilities for hauling out and repairing steamboats or sea-going vessels. The climate of Mobile is peculiarly adapted to the manufacture of cigars, for which industry there are 28 establishments. The oysters of Mobile Bay are large and very finely flavored, the fish varied and of most excellent quality; both of which are sources of considerable revenue.

The city is lighted by gas and the main business portion by electricity. The water-supply is pure and ample for all domestic purposes, but neither the distribution of mains nor volume of water is such as to guarantee security against destructive conflagrations. The site is very nearly level; slowly rising westward. The streets are broad—generally crossing at right angles—and many are beautifully shaded by long avenues of live-oak, interspersed with magnolia and mulberry, while in the adjoining yards and grounds may be seen the fig, orange, pecan, Japan plum, Japan persimmon, and japonica, besides a great variety of purely ornamental shrubs and flowers. Bienville Park and Washington Square are small but well laid out and attractive. The commerce and trade of Mobile during its greatest prosperity depended almost wholly on cotton, but new lines of railway and new business methods diverted much of this trade. The clay lands in the vicinity of Mobile, while not naturally fertile, have by careful cultivation and fertilization been made to produce garden vegetables in great abundance. There are in Mobile county about 300,000 acres of land well adapted to this industry. The earliest mention of cotton cultivation in the vicinity of Mobile appears in Bernard Roman's *Florida* (Phila., 1775). The earliest statistical date on the subject begins with 1817, the year in which the territorial government of Alabama was organized. The cotton receipts for various years are given below, the figures being for the year of production:

	Bales.		Bales.
1817	7,000	1865	429,102
1820	25,390	1870	404,673
1825	74,379	1875	374,672
1830	113,075	1880	392,318
1835	237,590	1881	265,040
1840	317,642	1882	313,228
1845	421,669	1883	254,651
1850	451,697	1884	236,871
1855	659,738	1885	240,000 est.
1860	549,441		

Prior to 1870 the depth of water across Choctaw Bar in the upper bay was only about 9 feet. By an expenditure of $400,000 a channel of 13 feet depth was secured in 1876, and at a further cost of about $600,000 a channel, having a minimum depth of 17 feet and bottom width of 76 feet, was completed in 1875. Large timber vessels now load at the wharves, and as a result that trade has very largely increased. The climate of Mobile is mild; the temperature rarely exceeds 98° or sinks below 20°. The annual rainfall averages 65 inches. In August of the years 1772, 1819, and 1832 the lower streets of the city were flooded by severe storms.

Mobile traces its history to 1702, when a fort was built here by Bienville (*q. v.*). It was incorporated as a town in 1814 and as a city in 1819. The population bears many traces of French and Spanish origin, but is largely composed of the descendants of early emigrants from the Southern Atlantic States. A census ordered by Galvez in 1785 showed a population of 746, which had increased to 1330 in 1788. A careful computation made by the American consul at New Orleans in 1803 made the population of Mobile 810, which in 10 years, or at the surrender by Gayetaud Perez, had dwindled to 500. The census reports show the following:

1820	2,672	1860	29,758
1830	3,194	1870	32,034
1840	12,672	1880	31,255
1850	20,515		

The latter was for the port of Mobile.

The municipal debt had become so burdensome that in 1879 the State legislature repealed the charter of the city and vested the management of the debt in a board of commissioners. The corporate limits were changed and curtailed, but a recent decision of the U. S. Supreme Court decides that the port of Mobile is the legitimate successor of the city of Mobile and bound by all its contracts. The municipal debt has, however, been arranged, and annual interest is now promptly paid. The total valuation of property is $14,000,000; public debt, $2,300,000. (W. H. G.)

MODOCS, a tribe of American Indians, originally of the Klamath family, though recently hostile to the Klamaths. They are mainly of interest from their warlike relations with the United States. Originally located on the southern shore of Klamath Lake, Cal., they are charged with having begun, in 1846, a career of treachery and murder, killing many white emigrants. In 1855 they were invited by Ben Wright, a frontiersman, to a peaceable feast. During this they were treacherously assailed, and 41 out of 46 killed. This murderous assault they never forgave. In 1856 there was a campaign against them; and many were killed, but they continued hostile till 1864, when peace was made, and they agreed to cede their lands and go on a reservation. Their reservation not being ready they were placed on that of the Klamaths. Here they were harassed by their old foes, cheated by government agents, and placed on land on which they could not live. In 1868 a turbulent band, known as Captain Jack's, left the reservation and returned to the old locality of the tribe. Here there were loud complaints against them, and in 1872 an effort was made to induce them to return to the reservation. As they refused the aid of the military was called in. A conflict ensued, they fired on the troops, and retreated to the lava beds—a volcanic region which formed a natural fortification, being seared with deep ravines, almost destitute of water, and very difficult to penetrate. Here they defended themselves desperately until June 5, 1873, with heavy loss to the troops, of whom 132 were killed and wounded. Among the killed were Gen. Canby and Peace Commissioner Thomas, who were treacherously murdered during an appointed conference with the Modoc chief. By the above date they were nearly all captured and the remainder surrendered. Captain Jack and three others were executed, Oct. 3, 1873. Those captured were placed on the Quapaw reservation in Indian Territory. They numbered 145. One hundred who took no part in the war remain on the Klamath reservation.

MOHAIR. See Goat, Angora

MOHAWKS. See Iroquois.

MOHEGANS, or Mohicans, a northerly branch of the Delaware Indians, who, at the coming of the Dutch, were found occupying both sides of the Hudson, to 75 miles from its mouth. They were then at war with the Mohawks. In 1628 they yielded to the assault of the Iroquois and removed to the Connecticut River. A branch of them had previously migrated to the vicinity of the Thames River, where they were known as Pequods. In this tribe a split took place, the seceding clan being known as Mohegans, and led by the celebrated sachem Uncas. The Connecticut branch afterwards returned to the eastern side of the Hudson. Uncas continued friendly to the English. He aided the English in their Indian wars, and against the French in 1690. In 1755 the Mohegans fought on the English side against the French. In the Revolution they fought on the side of the Americans. The remnant of the band had been settled on a reservation near Norwich in 1768. In 1842 they still occupied this reservation of 2300 acres, their numbers being reduced to 125, of whom only 25 or 30 were pure blooded. They are now much scattered, some remaining at Norwich, some being at Green Bay, Wis., and some with the Munsees in Kansas. The Mohegans have been made somewhat famous in literature through the influence of Cooper's celebrated novels of Indian life, of which a highly idealized Uncas is one of the principal heroes.

MOHL, Hugo von (1805–1872), a German botanist, was born at Stuttgart, April 8, 1805. He was a brother of the famous Orientalist, Julius Von Mohl (for whom see Encyclopædia Britannica). He studied medicine at the University of Tübingen, and in 1835 was made professor of botany there, and had charge of the botanic garden. He was in his time the highest authority on vegetable anatomy and physiology. He died at Tübingen, April 1, 1872. Among his works are *Beiträge zur Anatomie und Physiologie der Gewächse* (1834) and *Grundzüge zur Anatomie und Physiologie der vegetabilischen Zelle* (1851), and his *Vermischte Schriften*.

His brother, Robert von Mohl (1799–1875), was professor of jurisprudence at Tübingen and Heidelberg, and also prominent in the parliament of Baden. Among his works are *Die Geschichte und Literatur der Staatswissenschaft* (3 vols., 1855–58) and *Staatsrecht, Völkerrecht und Politik* (3 vols., 1860–69).

MOLESCHOTT, Jakob, a Dutch-Italian physiologist, was born at Bois-le-Duc, Holland, Aug. 9, 1822. He was the son of a physician and was educated at Heidelberg for the same profession. After two years' practice at Utrecht he was called to Heidelberg, where he lectured on physiological chemistry and anthropology. His thorough-going materialism drew on him much opposition. Finally he was compelled to withdraw and in 1856 went to Zurich as professor of physiology. In 1861 he accepted a professorship at Turin, where he also practised as a physician. Being naturalized he was made a senator of the kingdom in 1876. In 1878 he became professor of physiology in the University of Rome. He has given much attention to the subject of nutrition, to the liver, blood, bile, and milk, and to the structure of the muscles. His saying *Kein Phosphor kein Gedanke*—"No thought without phosphorus"—sufficiently indicates the results of his researches. His principal works are *Lehre der Nahrungsmittel* (1850), translated into English as *The Chemistry of Food and Diet* (1856); *Physiologie der Nahrungsmittel* (1850); *Der Kreislauf des Lebens* (1852); *Georg Forster der Naturfreund des Folkes* (1854); *Ursache und Wirkung in der Lehre vom Leben* (1867); *Von der Selbstbestimmung im Leben der Menschkeit* (1871); *Physiologisches Skizzenbuch* (1861).

MOLESWORTH, William Nassau, an English historian, was born at Millbrook, Nov. 8, 1816. He was the son of Rev. Dr. J. E. N. Molesworth and was educated at St. John's and Pembroke Colleges, Cambridge, graduating in 1839. Taking orders he became incumbent of St. Andrew's, Manchester, in 1841, and vicar of a church at Rochdale in 1844. He has taken an active part in regard to popular education, co-operation, and other social reforms. Besides some minor publications he is the author of a *History of the Reform Bill of* 1832 (1864); *A New System of Moral Philosophy* (1867); and a *History of England from the Year* 1830 (3 vols., 1871–73), of which an abridgment was issued in 1877.

MOLINE, a city of Illinois, in Rock Island county, is on the Mississippi River, just above the city of Rock Island, and 185 miles W. by S. of Chicago. It is on three important lines of railway. The rapids in the river-channel, which separates the island of Rock Island from the mainland, gives the town great water-power, which is utilized by means of a dam. The town has 3 hotels, 2 national banks, 2 daily and 2 weekly newspapers, and 8 churches. It carries on manufactures of lumber, ploughs, carriages, pumps, malleable-iron goods, organs, tubs, stoves, paper, screws, castings, carriages, etc. Coal is mined near by. The place was first settled in 1837; it was incorporated as a town in 1855, and as a city in 1872. It is lighted with gas and has a public water-supply. Population in 1870, 4166; in 1880, 7800.

MOLTKE, Helmuth Carl Bernhard von, Count, a German general, was born at Parchim, Mecklenburg, Oct. 26, 1800. He is descended from an old Mecklenburg family, and his father was an army officer. The family having removed to Holstein while Helmuth was a child, he was sent to the military academy at Copenhagen. In 1822 he entered the Prussian service as lieutenant and continued his military studies. In 1832 he was appointed a staff-officer, and as a result of his studies he published in 1835 an account of the Russo-Turkish war of 1828. He then undertook a journey in Turkey, and while there attracted the notice of the sultan, Mahmoud. The latter, appreciating the young officer's skill, sought his counsel in the reorganization of the Turkish army and the construction of defences of the empire. Moltke remained some years in Turkey, and accompanied the Turkish army in its campaigns against Mehemet Ali. After his return to Prussia he published *Briefe über Zustände und Begebenheiten in der Türkei aus den Jahren* 1835–39 (1841). Moltke, in 1845, was appointed adjutant to Prince Henry of Prussia, who then resided at Rome. Here he prepared a map of the city, and wrote some letters which have since been published. After the death of the prince, in 1847, Moltke was attached to the general command on the Rhine, becoming in 1849 chief of staff of the Fourth army corps. In 1858 he became chief of staff of the whole army, and in 1859 had the rank of lieutenant-general. Gen. Moltke made the staff the most effective means of directing and concentrating the force of the army. In 1864, when Prince Frederick Charles took the field against Denmark, Gen. Moltke had already drawn up the plan of the whole campaign, which was carried out almost to the letter. Still more brilliant were his services in the war with Austria in 1866. Here accompanying the king he not only enabled him to gain the overwhelming victory of Sadowa, in which he led the main army, but followed it up with a bold advance towards Olmutz and Vienna, which brought the seven weeks' war to an end. The king acknowledged his merit with the Order of the Black Eagle, and the Prussian Parliament voted him a dotation. Moltke at once prepared a plan for a French war, which he saw must soon follow. Modifications, of course, were made in the plan before the war actually came in 1870, yet the rapidity and accuracy with which the army was moved on the predetermined line of attack was due to the previous thorough study of the entire problem. After the invasion of France changes were promptly made as required by the varying circumstances of the campaign. While many others shared the glory of the brief war, which made Prussia the foremost country of Europe, and raised its king to the imperial dignity, Gen. Moltke was unrivalled in merit. In recognition of his services he was created a count on the day of the capitulation of Metz, Oct. 28, 1870, and was made chief marshal of the German Empire on the return of the army to Berlin, in September, 1871. Other honors were showered upon him by sovereigns and people. His ability in all departments of military science is universally acknowledged. He enjoys the unquestioned respect and confidence of the government, to which he has rendered services paralleled only by those of the great civil ruler Count von Bismarck. Besides accounts of his own campaigns Count von Moltke has published *Der italienische Feldzug von* 1859 and some technical military works. (J. P. L.)

MOMMSEN, CHRISTIAN MATTHIAS THEODOR, a German historian, was born at Garding, Schleswig, Nov. 30, 1817. He was educated at the Universities of Altona and Kiel, studying especially law and philology. Graduating in 1844 he spent over two years in travelling in France and Italy. In 1848 he was made professor of Roman law in the University of Leipsic, but his political activity caused his dismissal. He was called to Zürich in 1852 as professor of law, in 1854 to Breslau, and in 1858 to Berlin. His careful study of Italian antiquities had already borne numerous fruits in works on the early languages of that peninsula, its coins and inscriptions. His *Römische Geschichte* began to appear in 1854, and the fifth volume appeared in 1885, when the first three had already reached the eighth edition. The work has undergone steady revision. In it Mommsen gathered into one continuous narrative the results of his life-long investigations, adding to them fresh proofs of his keen deductive powers and his skill in applying comparative philology to historical problems. His views of the better-known parts of the history of the Roman republic have been attacked with some measure of justice. Notably is this the case in regard to Cæsar, for whom he has nothing but eulogy, and to Cicero, for whom, as a politician and a public man, he has nothing but words of censure. Mommsen's work in *The Earliest Inhabitants of Italy* was translated into English in 1858, and his *History of Rome* was translated by W. P. Dickson, first in 1862 and after revisions in 1871. Mommsen has also edited the *Digesta* of the *Corpus Juris Civitis* (5 vols., 1868–72), and published *Römische Staatsrecht* (2 vols., 1876–77), as well as numerous minor works.

See Vol. XVI. p. 746 Am. ed. (p. 720 Edin. ed.).

MONEY. This article is intended to treat chiefly of the use of money in the United States, yet there are some other points worthy of notice. First of all must be mentioned the distinction between money of account and real money. Mr. Stephen Colwell in his work on *The Ways and Means of Payment* devotes a highly valuable chapter to the subject. It is generally said that the principal functions of money are to measure value and to serve as a medium of exchange. But as the value of a commodity is expressed by any other given in exchange for it, so values, as Walker says, "may be expressed relatively to each other, by a simple scale of numbers. If I say that the values of three commodities are as 1, 7, and 4, I am using no fictitious measure of value. I take a unit, and say that there are in the one case 4 of these, in another 7, in the last only 1." This function, however, is performed by a common denominator and not a common measure of value. Perhaps a reference to the early use of this common denominator will bring out the distinction more clearly. Montesquieu describes a tribe in Northern Africa who measured the values of whatever was bought and sold by macutes. What were these? Once they existed and constituted the money of a country, but were used for purposes of valuation long after their disappearance. In his *Central Africa* Barth mentions the "rothl," which was used in the same manner, but which did not in his time exist. Formerly it had been used as money, and was used as a common denominator of value although the thing itself had disappeared. Another illustration nearer home and of later date may be added. Originally a pound of silver in England was cut into 240 coins called pence. Twelve of these were called a *solidus* or shilling. Applied to silver, the symbols lb. and £ meant equivalent weights, the former of uncoined, the latter of coined metal. The number of pence coined from a pound was increased until, in Elizabeth's time, 744 were coined from a pound of silver. Yet during this period 240 of these pence were called a pound, while £ and lb., both denoting the Latin *libra*, were no longer equivalent. The lb. of weight had remained the same, while the £ of money had dwindled to less than one-third. "Yet the name pound continued to attach to 240 pence, although the pence embodied a less and less quantity of silver. Each actual penny had less silver in it, and though it was still called a penny, the denomination, though spelled and sounded as before, represented less silver, and, therefore, less value, than before. The denominations," says Perry, from whom we have been quoting, "follow the fortunes of the coins, whose names they are, to the frequent loss of the unthinking, who suppose the same name must represent the same thing."

The functions of money are not confined to gold or silver or any specific commodity. In the early days of California exchanges were conducted by means of gold-dust, which passed from hand to hand by weight or guess. A sack of flour or other article was worth a certain number of grains. As it was inconvenient to weigh gold every time exchanges were made, a private coinage was introduced. These were not counterfeit, for the inscription was different from that put on the government coins. Their parentage was clearly indicated, and they were not a legal tender. They circulated readily until the government established a mint in that State and issued other coins. These packages of dust and private coins were money, just as much so as were the coins issued by the government, for they performed the same services, except that of constituting a legal tender in discharging debts. The functions of money, therefore, are not confined to one or a few things, and during our history many things have been used for that purpose. In the colonial times tobacco was extensively used as money in Maryland and Virginia. The use of wampum is well known. Shingles were used in the early days of Michigan, and skins have been used in many countries, and are still at some of the trading posts of the Hudson's Bay Company.

When the first colonists came to America they brought some money with them, and increased their supply through trade with the West India islands, and to some extent by issues from the mints in Massachusetts and Maryland. (See FINANCE, AMERICAN.) Beside the coined money thus obtained, all the colonies, sooner or later, issued paper money. This was begun by Massachusetts in 1690, and spreading through the colonies was continued in some of them nearly until the time of adopting the federal constitution. During the colonial period also some bank paper money was issued. (See BANKING.) The issues by the States during the war of the Revolution were in direct conflict with the issues of the Continental Congress, and the value of the entire quantity was impaired the more speedily in consequence of this policy. The reason for doing so was because neither the States nor Congress knew of any other way of carrying on the war.

After the formation of the government the coining of gold, silver, and copper was begun (see MINT), but for a long period the quantity coined was so small that it was necessary to use foreign coins for monetary purposes. Congress first authorized their use in 1793, declaring at what rates they should pass current, and that they should be a legal tender for the period of three years from the time the mint began operations. When that time expired their use was renewed by additional legislation for short periods until 1809. To determine their value they were assayed annually, and from the information thus obtained Congress could act intelligently in fixing the rates. After the supply of domestic coin became ample, foreign coins ceased to be used much as money, though, as they were mingled with the domestic coinage, they were to be constantly seen until the suspension of specie payments in 1861, when all coin disappeared.

The ideal money unit of the United States was established in 1785 by the Continental Congress and consisted of the dollar. This was a well-known coin, and had been in constant use for many years. Indeed, it competed with the pound as a measure of value; in some transactions the pound-measure was used; in other transactions the dollar-measure. Persons expressed their transactions in their books of account either in pounds or dollars. The term dollar is of ancient origin, and is traced through the Italians to the Romans. The Roman S (*semis*, weight or coin) is probably the origin of the modern $. The latter mark came into use in the middle ages to express the current value of the old Spanish dollar, which was good for eight reals. In French it used to be called "pièce de huit." This explanation must suffice for the figure 8. Now for the lines. The old thalers of Holland and Germany, which were coined long before the time of Charles V., had various values. To distinguish those of the Spanish king from the rest the lines were added. From this combination the dollar mark is derived. The word itself is evidently of German origin. As the people were familiar with the Spanish dollar, Morris recommended its use, and both Hamilton and Jefferson concurred. In his *Mint Report* Hamilton, in recommending what the weight of the dollar should be, did not take the lawful standard of the Spanish dollar of any particular issue, nor the average of the different issues, as his guide, but the actual average content of fine silver in the Spanish dollars then in circulation, which coin for many years previously had been, as it was then, the standard by which other moneys were generally measured, and in which contracts and money obligations in this country were discharged. Accordingly, the Mint Act of 1792 provided that "there shall be, from time to time, struck and coined at the said mint, dollars or units, each to be of the value of a Spanish milled dollar, as the same is now current, and to contain 371¼ grains of pure, or 416 grains of standard, silver." Linderman says that "the average quantity of fine silver contained in the Spanish dollars then in circulation in this country was, according to the assay of a number of pieces, 371 grains, to which was added ¼ of a grain to avoid inconvenient fractions in prescribing the weight of the coins under the ratio of 1 to 15. The silver dollar remained the unit of value until 1873, when Congress declared that among the "gold coins" of the United States there "shall be a one-dollar piece, which, at the standard weight of 25.8 grains, shall be the unit of value." And this is the unit of value of the present time.

If the people had depended solely on coined money, whether of our own or of other governments, to effect exchanges, no little distress would have been caused by the scarcity. Notwithstanding the terrific experience in issuing paper money, the national government chartered a bank for twenty years with power to issue notes which should, and did, circulate as money (see BANKING). The States also authorized banks of issue. The doctrine was maintained by the courts that while the States were forbidden by the Constitution from emitting "bills of credit," they could charter banks possessing essentially this authority. But the States could not do this themselves. In the famous case of Briscoe *vs.* Bank of Kentucky (11 *Peters' Reports*, 257) it was decided that a note of circulation, "issued by a State, involving the faith of the State, and designed to circulate as money on the credit of the State, in the ordinary course of business," was a bill of credit, and therefore could not be issued. A few years earlier the case of Craig *vs.* The State of Missouri was decided. The State had passed an act establishing loan-offices, which were to issue certificates of the following form: "This certificate shall be receivable at the treasury of any of the loan-offices in the State of Missouri in discharge of taxes or debts due to the State, for the sum of — dollars, with interest for the same, at the rate of two per centum per annum from this date." These certificates were to be receivable at the treasury, and by tax-gatherers and other public officers, in payment of taxes, or moneys due, or to become due, to the State, or to any town or county therein, and by all officers, civil and military, in the State, in discharge of salaries, etc. The court decided that these certificates were "bills of credit" within the meaning of the Constitution, and void. The court said that in its enlarged and perhaps literal sense the term bill of credit might comprehend any instrument by which a State engages to pay money at a future day, thus including a certificate given for money borrowed. The word "emit" is never employed in describing those contracts by which a State binds itself to pay money at a future day for services actually received, or for money borrowed for present use. "To emit bills of credit" conveys to the mind the idea of issuing paper intended to circulate throughout the community for its ordinary purposes, as money; which paper is redeemable at a future day. This is the sense in which the terms have always been understood. These decisions checked the efforts of the States to issue money in any form, but the State banks circulated large quantities of notes throughout the whole period until they were taxed out of existence in 1865.

The national government also circulated treasury notes on four different occasions (see FINANCE, AMERICAN) previous to the issue of legal-tender treasury notes in 1862. These notes circulated to some extent as money, but the demand treasury notes authorized by Congress in July, 1861, and the much larger quantity possessing the legal-tender quality, authorized at the next session, circulated as money, and were authorized with this expectation. There were various other notes issued during the war bearing interest, either simple or compound, and running for one, two, and three years, which at times entered largely into circulation and at other times were withdrawn. They were not intended for circulation, and the secretary of the treasury resorted to various devices to prevent this, because they swelled the already overflowing monetary stream and served to dilute the quality. They were rapidly withdrawn after the war closed, and then the two principal forms of money were the national legal-tender notes and the national bank notes, with a fractional paper money to make payments for less than a dollar. After the restoration of specie payments, in 1879, gold and silver were added. Certificates of deposit, issued against gold and silver, have also circulated, the latter very extensively. Although fractional paper money has been withdrawn, it will be seen that a very considerable variety of instruments is now used for a monetary purpose in the United States.

On Oct. 31, 1885, according to the report of the comptroller of the currency, there were outstanding in national bank notes $314,894,818 and in "greenbacks" $346,681,016, making an aggregate of $661,575,834 in paper money, for which the credit of the United States government is responsible. At the same date the money of the United States in actual circulation was estimated as follows: Gold, $251,476,288; silver, $107,914,611; and paper currency, $470,401,878. Apart from this, the U. S. treasury held, after deducting what was covered by coin certificates, in gold, $142,338,598; in silver, including bullion, $190,623,414; and in paper currency, $27,550,341; and in banks, national and State, held in gold, $192,912,910; in silver, $9,120,802; and in paper currency, $164,575,960. (A. S. B.)

MONITOR. See Iron-clads.

MONMOUTH, a city of Illinois, county-seat of Warren county, is situated upon the prairie, 27 miles E. of Burlington, Iowa, on the main line of the Chicago, Burlington, and Quincy Railroad, at its junction with the Rock Island and St. Louis division. The Illinois division of the Iowa Central Railway also passes through the city. It has a large opera house, a Masonic temple, and numerous substantial buildings. Monmouth College (United Presbyterian) occupies a large three-story structure on a beautiful and prominent site in the eastern part of the city. The college was founded in 1856, and now has about 400 students. There are 4 hotels, 2 national banks, 1 daily, 2 weekly, and 2 college newspapers. There are 13 churches, chiefly United Presbyterian and Presbyterian; but the Catholic has the finest building. Two large agricultural implement factories employ about 300 men, 3 cigar factories employ about 50 men and boys, and a sewer-pipe factory employs 65 men. The city is gas-lighted, and has 3 small parks. The total assessed valuation of property in the city in 1885 was $980,358, being one-third the real value. The city is free from debt. Monmouth was settled in 1829, chartered in 1852, and incorporated in 1883. It has always been noted for its high morality. Population, 5000.

MONMOUTH, Battle of, was fought at Freehold, Monmouth co., N. J., June 28, 1778, between the American army, under Washington, and the British, under Sir Henry Clinton. The latter had withdrawn from Philadelphia on June 18, having received information of the French alliance. He was hastening to New Brunswick on his way to New York. Washington, while still at the winter-quarters at Valley Forge, had learned of his movements and resolved to intercept him. This plan was strenuously opposed by Gen. Charles Lee, who had recently arrived in the camp, having been exchanged after some months' captivity. Washington, after his army had crossed into New Jersey, had intrusted the advance to Lafayette, but Lee by his entreaties induced the young French officer to yield the command to him, as the senior. Clinton, finding the Americans about to cross his path, turned further to the right, and Washington resolved to attack at once. On the 27th, which was a day of heavy rain, Lee was at Englishtown, 5 miles from the main body of the British, who were on high ground near Monmouth court-house. He had orders to attack the rear of the enemy and hold it in check until the rest of the Americans, then 3 miles off, should come up. He made no plan, however, and refused to give orders. Clinton sent off his baggage and then attacked the nearest body of Americans. These were thrown into confusion and retreated, while Lee still refused to act. Lafayette and others sent word to Washington that his presence was needed on the field. As he rode forward he encountered a disorderly crowd of fugitives, and broke out into severe reproof of Lee, who now pleaded that he had never been in favor of the attack. Washington ordered him to the rear, rallied the troops, and urged forward the main body to their support. Lord Stirling arrived first with the left wing, while Gen. Greene commanded the right. On the latter a determined attack was made, but it was repulsed with heavy loss, including Col. Monckton, of the royal grenadiers. The British retreated to the high ground they had occupied in the morning. During the night Clinton quietly withdrew, abandoning the severely wounded and leaving his dead unburied. On account of the excessive heat and the fatigues of the battle no pursuit was made. The American loss was 69 killed and 160 wounded; the British loss was about 400, while 800 deserted during the march. Several are reported to have died at Monmouth from the heat, which reached 96° in the shade. (In connection with the foregoing, see also Lee, Charles.)

MONROE DOCTRINE, The. Very early in the development of our constitutional history it became necessary to decide upon the attitude of our government toward questions in European politics. Unlike republican France, which entered on a propaganda of republicanism, the United States pursued a policy of peace and friendship with all nations, free from entangling alliances with any. This policy was declared in President Washington's "Proclamation of Neutrality," and, reasserted as a principle in his "Farewell Address," it became an established maxim of our politics. But the correlative doctrine, that European powers should not be permitted to intervene in American questions, was not so early brought forward. It was scarcely possible that it should be before the rise of that consciousness of national power that accompanied the advance of prosperity as the country recovered from the exhaustion of the second war with Great Britain, and began its migrating movement into the western wilderness. It appears from Jefferson's private correspondence that the idea had occurred to him, as it probably had to others. But there is no public assertion of it on record earlier than the message of President Monroe in 1823. The "Holy Alliance," formed by Austria, Russia, and Prussia after the fall of Napoleon, and acceded to by most of the European states, while ostensibly directed to the maintenance of peace and friendship among themselves, was in fact a league for the mutual support of royal dynasties. In virtue of this league, Austria, in 1821, had crushed the revolutions in Naples and Piedmont, and France, in 1823, suppressed constitutional government in Spain. France and England soon after retired from the alliance. The Spanish-American colonies had meanwhile declared their independence, which the United States and England acknowledged. It was a question whether the allied powers might not attempt to restore Spanish rule in Mexico and South America. The British government intimated a readiness to combine with the United States in a counter-alliance; but our government could not accede to this without departing from the doctrine which was Washington's legacy to his country. What it would do it would do singly for itself. President Monroe accordingly expressed in his message our pacific disposition toward European powers, and our indisposition to take any part in their wars among themselves unless our own rights were invaded; but with American states we had too much in common not to take an interest in our common defence and welfare.

> "We owe it, therefore, to candor," he said, "and to the amicable relations existing between the United States and [the allied] powers, to declare that we should consider any attempt on their part to extend their system to any part of this hemisphere as dangerous to our peace and safety. With the existing colonies or dependencies of any European power we have not interfered and shall not interfere. But with the governments who have declared their independence and maintained it, and whose independence we have, on great consideration and just principles, acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the United States."

Another branch of the subject had arisen in negotiations between the Russian government and the United States concerning their respective rights and interests on the north-west coast of the continent. "In the discussions to which this interest has given rise," said Mr. Monroe, "and in the arrangements by which they may terminate, the occasion has been judged proper for asserting, as a principle in which the rights and interests of the United States are involved, that the American continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as subjects for future colonization by any European powers."

It has been confidently asserted that Mr. Monroe was not the author of these paragraphs, but that they were from the pen of John Quincy Adams, then secretary of state; but of this there is no evidence. It is merely an inference from some known circumstances. That the policy expressed in these declarations was supported by Mr. Adams there can be no doubt, and it is by no means unlikely that the expression of his views had an influence on the style of the message; but there are no explicit proofs that he was the author of any part of the message. A more important question concerns the originality of the policy Mr. Monroe declared. Mr. Charles Sumner affirmed that the initiative was taken by the British government, and that George Canning was the real author of the so-called Monroe Doctrine; but this also goes beyond the evidence. The British government did propose to ours some joint action against the Holy Alliance; and when Mr. Monroe took an independent position, and asserted a purely American policy, Mr. Canning, in his place in Parliament, generously and eloquently eulogized our government for its courage and firmness.

But the Monroe Doctrine never received the sanction of Congress. President J. Q. Adams proposed a congress of the republics of the continent at Panama, but our Congress disapproved of it. President Garfield in 1881 invited them to a conference at Washington, but his death arrested, and his successor seceded from, the proposal. On the other hand, in the CLAYTON-BULWER TREATY (*q. v.*) of 1850, our government was oblivious of the Monroe Doctrine and sanctioned its violation. Yet the doctrine holds its ground as a tradition of the executive department and of national feeling, and is often appealed to. The most conspicuous instance of its assertion was in the pressure successfully put upon Napoleon III. to make him withdraw from his support of the unhappy Maximilian's imperial throne in Mexico. The force of the doctrine lies in the certainty that on any occasion of sufficient importance to affect popular feeling it will have the support of the whole nation. (For James Monroe see ENCYCLOPÆDIA BRITANNICA.) (L. E. S.)

MONTALEMBERT, MARC RENÉ DE, MARQUIS (1714–1800), a French military engineer, was born in Angoulême, July 15, 1714. He was descended from an ancient family of Poitou, and was grandfather of the celebrated Count de Montalembert, author of the *Monks of the West* (for whom see ENCYCLOPÆDIA BRITANNICA). Marc was trained to arms and served in Italy, Flanders, and Germany. He afterwards established foundries and supplied cannon to the French army. His proposed innovations in the art of fortification were long opposed by the French engineers. But after he had successfully applied his principles in constructing the fort of Ré, other fortresses were erected of the same kind. On the outbreak of the Revolution he became its partisan and gave up his pension in favor of the National Convention He also presented to the government his foundries and various models and plans. Though his services were acknowledged by the convention, yet after he had become involved in difficulties he obtained little relief. He died March 29, 1800. His great work *La fortification perpendiculaire, ou l'Art défensif supérieur à l'offensif* (11 vols. 1776–96) was published at his own expense. His system of detached forts found more favor in other countries than in France. It has entirely subverted the methods of attack as well as of defence. It is especially suited to the defence of harbors.

See Vol. XV. p. 798 Am. ed. (p. 772 Edin. ed.).

MONTANA, a North-western Territory of the United States, was a part of the Territory of Idaho until May 26, 1864, when it was organized into a separate Territory. In 1873 a re-survey of the eastern boundary added about 2000 square miles to its territory from Dakota, making the present area 146,080 square miles, or 93,491,200 acres. It is the fourth political division of the Union in size, Texas, California, and Dakota being larger. Its area is more than 3½ times that of Ohio, and more than 2½ times that of Illinois. Fully three-fifths of the area of the territory on the eastern side consists of vast, rolling plateaus, treeless, verdureless, and unfit for agricultural use without irrigation, for which no adequate means are now known. (See BAD LANDS in Vol. I.) The valleys of the mountains in the western portion are exceedingly fertile, and where sufficient rainfall exists are very productive; generally, too, they are easy of irrigation. The Indian reservations of the Territory aggregate 45,000 square miles, or nearly 30,000,000 acres, of the very finest agricultural and grazing lands on the continent. The number of Indians on these lands is about 18,000. The population of the Territory in 1880 was 39,157. Since that time there has been no accurate census. The Territory is so large, and the population so scattered for the most part, that it is difficult to arrive at any reliable statistics of population. The most careful estimates possible have been based on the return of votes cast at Territorial elections; these estimates placed the population at 80,000 in 1883 and at 110,000 in 1886.

Agriculture.—The numerous valleys in the western parts of the Territory have an excellent soil for agricultural purposes. The climate, notwithstanding its high altitude, is much milder than in corresponding latitudes outside the Cordilleran Mountain system. The amount of rainfall is rarely sufficient; but, where irrigation is possible, the culture of the soil yields large returns in wheat, oats, barley, and vegetables of all kinds, all unsurpassed in quality. The Territory is not and can never become a great agricultural region. The obstacles of altitude, latitude, and dryness are too serious to be overcome to the extent necessary to make profitable large ventures in soil-culture. Notwithstanding all these difficulties it must be noted that there is a steady increase in the acreage and products of the principal grains in recent years. In 1883 the acreage of wheat was 57,796, yielding 942,000 bushels, and valued at home at $866,640; corn 502 acres, 10,040 bushels, $9036; oats 32,200 acres, 1,210,000 bushels, $701,801. In 1884 the acreage of wheat was 76,240, yield 1,372,000 bushels, value $960,000; corn 830 acres, 20,700 bushels, $15,525; oats 52,000 acres, 1,740,000 bushels, $609,000. In 1885, wheat 83,864 acres, 1,715,000 bushels, $1,320,000; corn 880 acres, 22,000 bushels, $17,000; oats 53,560 acres, 1,755,000 bushels, $745,500. The placer mining of the precious minerals, which attracted the early settlers, having been largely exhausted and the quartz mining reduced to a scientific application of labor and capital, the increasing population have been turning their attention largely to live stock. This business has been found to be easy and profitable, and the interest is increasing annually. In 1883 the number of cattle in the Territory was 287,210, valued on the ground at $4,699,812; sheep 362,776, value, $1,018,124; horses 67,000, value, $3,197,020. In 1884 the cattle had increased to 475,000, with an appraised value of $14,250,000; sheep 700,000, worth $2,100,000; horses 90,000, worth $6,787,000. In 1885 the number of cattle was 900,000, horses 120,000, and sheep 1,200,000. Very little shelter or feeding is required to raise the stock even in the winter; the average loss rarely exceeds 5 per cent., and the profits range from 25 to 50 per cent. on the capital invested.

Minerals.—A large portion of the area of the Territory is known to be underlaid by coal, but the explored fields are comparatively limited in extent. While some authorities have estimated the coal area at 60,000 square miles, it seems certain that this is a large over-estimate. The known and examined fields are the Bozeman, 5 square miles; Gardiner, 3 square miles; Rock Creek, 15 square miles; Sand Coulee, 50 square miles; Judith, 24 square miles; Bull Mountain, 60 square miles; and several square miles in the Swimming Woman field. Besides these named there is a vast area bordering on the Missouri River on both sides, and reaching down to and far below the Yellowstone, and extending from the eastern boundary of the Territory to the Musselshell River. This eastern field occupies over 25,000 square miles, and at almost every point in it the characteristic lignites are readily found. Along the line of the Yellowstone, at stations on the Northern Pacific Railroad, coal mines have been opened from Glendive to Sanders. In the present unsurveyed state of the larger portion of the Territory it is impossible to correctly estimate the extent of the coal area, but it is safe to say that at least 25,000 square miles of coal-bearing area exists. The characteristic coal is a rather inferior lignite, but in the Judith, Bozeman, Sand Coulee, Gardiner, and Rock Creek fields, the coal is bituminous and makes a fairly good coke. In 1884 there were 3 coking establishments in operation using 17 ovens; 165 tons of coal were used, yielding 46 per cent. of coke, or 75 tons, and worth about $12 per ton.

Iron in some form exists in almost every county in the Territory, but no manufacture of it has yet been attempted. Copper is found in many places, usually in connection with other minerals, notably silver. The production of copper in 1882 was 9,058,284 pounds; in 1883, 24,664,346 pounds; in 1884, 43,093,054 pounds; and in 1885, 67,797,864 pounds. Lead is found in paying quantities, the yield in 1883 being 5000 tons, and in 1884 7000 tons. There are 144 mineral springs in the Territory, only 8 of which have been thoroughly analyzed. Gold and silver are the most important metals. It was the discovery and development of these that led to the settlement of the Territory. Gold was discovered in small quantities in 1861, but not such as to deserve attention until the following year; then mining began on a large scale, drawing immigrants from every State in the Union and from almost every country in the world. For the ten succeeding years the average yield from the placer diggings was from $12,000,000 to $15,000,000 per annum. Mines of this class being easy of access and requiring no capital were rapidly exhausted. As the placer mines became exhausted quartz mining of both gold and silver was commenced. This was slower in developing, requiring great labor and considerable capital. In 1875 the yield was not above $1,000,000 per annum; it was in 1886 about $21,000,000. The number of gold and silver mines operated was 5 in 1883, the dividends from which were $513,824; in 1884 there were 8 mines, and the dividends reached $922,000. The gross value of all minerals exported from the Territory in 1885 was as follows: Silver, $10,000,000; copper, $7,000,000; gold, $2,500,000; lead, $750,000. The exports of beef-cattle were valued at $4,500,000; wool, $1,400,000; peltries and furs, $250,000; total value of all exports, $26,400,000.

Finances.—The total valuation of all property in 1880 was $18,609,802. In 1881 it had risen to $24,040,801; in 1882 to $33,211,312; in 1883 to $46,560,300. This is exclusive of the mines, which are not taxable and of course are not assessed. The estimated value of the gold and silver mines is put at $50,000,000, thus swelling the valuation of the Territory to about $100,000,000. In 1880 the Territorial debt was $67,000, bearing interest at 7 per cent.; this debt matured in 1883 and was paid, leaving the Territory without debt in 1886. The total debt of the 13 counties and the various school districts is less than $1,000,000. The tax levied for the support of the government is about 3 mills on each dollar of assessed valuation. In 1883 there were 25 banks in the Territory, 9 of which were national. Four national banks were at Helena, and showed a combined capital of $875,000, with deposits averaging $4,500,000. In 1885 there were 15 national banks, with loans and discounts amounting to $5,515,195.02. The internal receipts in 1885 amounted to $68,001.91, and in 1886 to $90,215.20. The number of miles of railway in 1879 was 10; 1880, 110; 1881, 267; 1882, 659; 1883, 858; in 1886 about 1058.

Education.—The school law of the Territory, adopted in 1872, is substantially the same as that of California, from which it was originally copied, with such alterations and subsequent amendments as better adapted it to Territorial wants. The same principle of Territorial and county supervision is preserved, while the trustees are elected, one each year, for a term of three years, voted upon by all of legal age without distinction of sex; these school-trustees are the principal officers, though each district is a republic by itself, the assembled voters of which may tax all property within the district, under certain restrictions, to provide houses for the schools, select and pay teachers, and grade the schools as high as they may please. The schools are open to all without distinction of race or color, and are prosperous. The schools are supported chiefly by a tax of not less than 3 nor more than 5 mills on the dollar; also from the unlimited taxes which may be voted by the districts, as noted above, and from a fund arising from the sale of town lots previously reserved to provide for the erection and furnishing of school buildings. In 1883–84 the number of school age, 4 to 21, in the Territory was 15,082; number enrolled in the public schools, 8118; average daily attendance, 4465. The number of districts was 216; of schools, 203; average time of schools, 103 days; and the total valuation of all school property, $335,371. The number of teachers was 292, of whom 97 were male and 195 female. The average monthly pay of the male teachers was $70.50; female, $64.00; and the average of both, $66.70. The total expenditures for the schools was $260,030. No schools for advanced education, save high-school departments in certain schools, were reported as late as 1885. In 1880 only 4.8 per cent. of the entire population were unable to read, and 5.3 per cent. unable to write.

Religion.—The state of religion and morals is not of the best. It has become much better since the failure of the placer mines and the drifting away of the refuse population that had gathered together. The number of the organizations, ministers, and members of the different denominations, according to the latest report, was as follows:

Denomination.	Church.	Clergy.	Members.
Roman Catholic	10	13	16,450 pop.
Christian	6	4	675
Methodist Episcopal	8	6	364
Protestant Episcopal	8	6	300
Methodist Episcopal South	9	9	232
Presbyterian	6	7	194
Jews	...	...	131 pop.

The history of Montana since its Territorial organization is the history of every frontier settlement; lawlessness, migration of the population, hardships, troubles with the Indians. On the Little Big Horn on June 25, 1875, a most disastrous battle was fought between the Seventh U. S. cavalry, numbering about 330 men and commanded by Gen. Custer, and 5000 Sioux commanded by Sitting Bull. Gen. Custer and 261 officers and men were slain. (See CUSTER, GEORGE A.) (A. G. M.)

MONTCALM, DE SAINT VÉRAN, LOUIS JOSEPH, MARQUIS DE (1712–1759), a French general, was born near Nîmes, Feb. 28, 1712. Entering the army at the age of 14, he served in Italy and Germany with distinction. He was made colonel in 1746, and ten years later was sent to Canada to take command of the French troops there. In August, 1756, he captured Fort Ontario at Oswego, and in 1757 captured Fort William Henry, with 2500 men and 42 guns. In 1758 he occupied and strengthened Ticonderoga, which the French called Fort Carillon. By carefully choosing his ground, with only 3600 men he repulsed, on July 8, 1758, Gen. Abercrombie's army, four times as large. In spite of his eminent services his personal relations with the governor of Canada were not pleasant, and he received little aid from France. When Great Britain redoubled her efforts for the capture of Canada in 1759, Montcalm, knowing that all depended on the fate of Quebec, mustered his forces on the Montmorency to oppose Gen. Wolfe, who was advancing with 8000 men. He repulsed the first attack on July 31. But Wolfe, on the night of Sept. 12, landed his troops secretly on the left bank of the St. Lawrence, and climbed the Heights of Abraham in the rear of Montcalm's army. In the morning Montcalm began the attack, but his troops were broken by the fire of the British and utterly dispersed by their bayonet charge. Montcalm had already been mortally wounded while attempting to rally some fugitives. On being told that death was near he exclaimed, "So much the better: I shall not live to see the surrender of Quebec." He died on Sept. 14, 1759. Wolfe also had fallen in the moment of victory, and now a common monument on the plain of battle bears their names and attests their valor. See Francis Parkman's *Wolfe and Montcalm*.

MONTEFIORE, Sir Moses (1784–1885), a Jewish philanthropist, was born at Leghorn, Italy, Oct. 24, 1784, his parents being there on a visit. His father was a banker in London, and Moses became a successful merchant. In 1828 he was elected as a member of the Board of Deputies of British Jews, which had been formed in 1760 for the protection of persons of that faith. In 1835 he became president of the board, and in 1837 was elected sheriff and made a baronet. In 1840 he went to Damascus in company with other distinguished Jews, to investigate the persecutions of their brethren. From time to time he visited Jerusalem in behalf of the Jews living there, making his last visit in his ninety-second year. His hundredth birthday was celebrated with public rejoicings by the Jews throughout the civilized world, and many congratulations were sent to him by various societies. His benevolence was not confined to those of his own creed; he gave generously to hospitals and other charitable and benevolent purposes. He died July 28, 1885.

MONTGOMERY, a city, the capital of Alabama, and county-seat of Montgomery county, stands on the left bank of the Alabama River, in 32° 21′ N. lat., 86° 25′ W. long. Six railway lines either pass through or terminate in the city, and the river is navigated by large steamers throughout the year. The city occupies a pleasant, hilly site, 175 feet above sea-level. It has a fine State capitol, U. S. government buildings, 13 hotels, 2 national and 5 other banks, 4 weekly and 2 daily newspapers, 14 churches, a fine Masonic building, and 2 theatres. There is a good public-school system for both white and colored pupils, several private schools, and a college for girls. Montgomery has an excellent fire department. The water supply is partly from the Alabama River and partly from wells, both surface and artesian. Among the adornments of the city is a beautiful fountain. Pickett Springs Park is 4 miles from the city. There are over 100 factories and shops of various kinds, including flour-mills, steam cotton-gins, a cotton-factory, 3 foundries, fertilizer-works, oil-works, brick-kilns. Cotton is one of the leading articles of shipment. The city is the seat of a large distributing and collecting trade with the fertile region around it. It was founded in 1817; became the State capital in 1847; and in 1862 was for a time the provisional capital of the Southern Confederacy. Montgomery is now a winter health resort. The population in 1870 was 10,588; in 1880, 16,713.

MONTGOMERY, Richard (1736–1775), an American general, was born near Raphoe, Ireland, Dec. 2, 1736. He entered the British army at the age of 18, and served at the siege of Louisburg in 1758. He was also distinguished in expeditions against Martinique and Havana. In 1772, having settled in New York, he married a daughter of R. R. Livingston (for whom see Encyclopædia Britannica). After being a member of the New York provincial congress in 1775, he was appointed brigadier-general in the continental army, and sent against Canada under Gen. Schuyler. The latter falling ill, the command of the expedition devolved on Montgomery. After capturing St. John's and Montreal he joined Gen. Arnold, who, after a disastrous march through the wilderness of Maine, had reached Quebec. A joint attack was made at 2 a. m., Dec. 31, 1775. The night was dark and stormy; Montgomery was killed and Arnold wounded, and though part of the troops entered the town the attack failed. Montgomery's body was honorably buried within the city, but in 1818 it was removed to St. Paul's churchyard, New York city, where a monument to his memory had previously been erected by order of Congress.

MONTI, Vincenzo (1754–1828), an Italian poet, was born at Alfonsine, near Ferrara, Feb. 19, 1754. He was educated at the University of Ferrara, where he studied with great zeal the poets of Italy, ancient and modern. His own poem, *La Visione d' Ezechiello* (1776), gained the approval of Cardinal Borghese, who brought him to Rome. Here he was known as Abbate Monti, though he never took orders, and in 1778 he became secretary to Cardinal Braschi. Monti's odes won general applause, but his fame was eclipsed by that of Alfieri. Attacking the latter on his own ground, he composed the tragedy of *Aristodemo*, and was thought to surpass him. But Monti's *Galeotto Manfredi* (1788) did not sustain his reputation. In 1793 his splendid poem *Bassvilliana* powerfully expressed the horror of the civilized world at the excesses of the French Revolution. Yet a few years later the author became an ardent worshipper of Bonaparte, and in *Musogonia*, *Superstizione*, *Fanatismo*, and other poems he applauded the new order of things. He received his reward in being made secretary of the directory of the Cisalpine Republic, and afterwards commissary in the Romagna. In 1799 he fled to France, but after the battle of Marengo returned and published various odes in praise of Napoleon. In 1803 he was made professor of belles-lettres at Milan, and soon after professor of rhetoric at Pavia. He translated *Persius* and the *Iliad*, and published some philological dissertations. After the downfall of Napoleon Monti tried to win the favor of the Austrian emperor, but without success. He died at Milan, Oct. 13, 1828. Monti was the greatest Italian poet of his time; he belonged to the classical school of the eighteenth century. His works are distinguished by pleasing images, in which nature appears refined from all grossness. His poems are eloquent echoes of the popular opinions of the time, but they fail to present the truth, which belongs to all times. His complete works were published at Bologna (8 vols., 1825–28), and a select edition at Milan (5 vols., 1832–34). Sketches of his life were written by Odaleschi (Florence, 1829), Bozoli (Ferrara, 1837), and Cesare Cantu (Turin, 1861).

MONTYON, Antoine Jean Baptiste Robert Anger, Baron de (1733–1820), a French philanthropist, was born at Paris, Dec. 26, 1733. He was intendant of the provinces of Limousin, Auvergne, and Provence, and obtained the title of honorary chancellor of the Count of Artois. At the outbreak of the French Revolution he fled to England, where he published various works on the comparative effects of taxation, on the most celebrated ministers of finance from 1650 to 1791, and on the principles of French monarchy. He returned to France in 1815, and died at Paris, Dec. 29, 1820. He is best known by the Montyon prizes, which he founded in 1782, and renewed in the last years of his life. According to his will the French Academy every year distributes prizes of 10,000 francs to the poor French person who has performed the most virtuous deed, and to the author of the book most conducive to good morals; the Academy of Sciences also awards similar prizes to the person who has made in the year some medical or surgical improvement, and to the person who discovers the means of rendering any mechanical art less unhealthy. Montyon's name is often given as Monthyon.

MOODY, Dwight Lyman, an American evangelist, was born at Northfield, Mass., Feb. 5, 1837. After working on a farm, he became a clerk in a shoe store at Boston in 1854, and joined the Congregational Church. In 1856 he went to Chicago, where he engaged zealously in Sunday-school missionary work. During the civil war he was an active worker in the Christian Commission. Afterwards he was made city missionary of the Young Men's Christian Association of Chicago, and had a church built for the accommodation of his converts. In 1871 the great Chicago fire destroyed the church and all his possessions, but a new church was soon erected by aid from other places. Mr. Moody was now called to make religious addresses in various parts of the United States, and he induced Mr. Ira D. Sankey, of Newcastle, Pa., to assist him in his labors by singing evangelical hymns. In 1873 the two evangelists went to Great Britain and had great success in the principal cities. In 1875 they returned to the United States and resumed their work. The profits of the *Gospel Hymns*, prepared by them, have been devoted to furthering the education of Christian workers, and a school has been established for the purpose at Northfield, where Mr. Moody's friends have provided for him a home. A school has also been established there, in which religious instruction is prominent.

MOORE, Benjamin (1748–1816), an American bishop, was born at Newtown, Long Island, Oct. 5, 1748. He graduated at King's College, now Columbia, in 1768, and went to England for ordination by the bishop of London. In 1774 he was made assistant minister of Trinity church, New York city, and in 1800 became rector. He was consecrated bishop of New York, Sept. 11, 1801. He was also president of Columbia College from 1800 to 1811, when he was disabled by paralysis. He died at Greenwich, N. Y., Feb. 27, 1816. Two volumes of his sermons were published after his death.

His son, Clement Clarke Moore (1779–1863), was born at New York, July 15, 1779. He graduated at Columbia College in 1798, and was ordained to the ministry. In 1821 he was appointed professor of Hebrew and Greek literature in the Protestant Episcopal Seminary at New York, to which he gave the lot of ground on which it stands. He retired from his professorship in 1850. He died at Newport, R. I., July 10, 1863. He published a *Hebrew and Greek Lexicon* (1809); *George Castriot* (1850); but he is best known as the author of the poem, "The Night before Christmas."

MOORE, Jacob Bailey (1797–1853), an American journalist and antiquarian, was born at Andover, N. H., Oct. 31, 1797. He was a son of Dr. J. B. Moore, U. S. A. (1772–1813), noted as a song writer. The son became a printer at Concord, N. H., and in 1823 a bookseller and publisher. In 1826 he began to edit the *New Hampshire Journal*, but went to New York city in 1839, and edited the *Daily Whig*. He was a government clerk in Washington, then librarian of the New York Historical Society, and from 1849 to 1853 was postmaster of San Francisco. He died at Bellows Falls, Vt., Sept. 1, 1853. Among his publications are *Collections, Topographical, Historical, and Biographical, relating to New Hampshire* (3 vols., 1822–24); *Annals of the Town of Concord* (1824); *Laws of Trade in the United States* (1840); *Memoirs of American Governors* (1846, unfinished).

His son, George Henry Moore, was born at Concord, N. H., April 20, 1823. Going with his father to New York city in 1839, he became assistant librarian of the New York Historical Society in 1841, and librarian in 1849. He was the first librarian of the Lenox Library. He published *The Treason of Charles Lee* (1860); *Employment of Negroes in the Revolutionary Army* (1862); *Slavery in Massachusetts* (1866), and *History of the Jurisprudence of New York*. The University of the City of New York gave him the degree of LL. D.

Another son, Frank Moore, was born at Concord, N. H., Dec. 17, 1828. He has published *Songs and Ballads of the American Revolution* (1856); *Diary of the American Revolution* (1860); *Lyrics of Loyalty* (1863); and *Rebel Rhymes and Rhapsodies* (1864). He also published *The Rebellion Record* (12 vols., 1861–71). He was secretary of legation at Paris from 1869 to 1872.

See Vol. VII. p. 23 Am. ed. (p. 24 Edin. ed.).

MOOSE, the name given in the United States to a species of elk, *Alces Americanus*, formerly supposed to be identical with the European elk, but now considered specifically distinct. This animal is the largest and strongest of the deer kind, being as large as a horse, and of remarkable strength and powers of endurance. It is an awkward and unsymmetrical animal in appearance, having a short, compact body on long legs, and a large, narrow head, nearly two feet long. Its upper lip is long and flexible, its eyes small and deep-seated, its ears more than a foot in length. The antlers are large, of flattened shape, with many snag-like branches, the weight being 40 to 70 lbs. The animal is 5 feet high, 7 feet long, and weighs about half a ton.

The range of the moose is somewhat extensive through the colder regions of North America. In the East it extends from Northern New York to Labrador. It is not uncommon in Northern Maine. In the West it extends from Oregon to the Arctic seas. In the summer it frequents lakes and rivers, for the purpose of escaping its insect plagues. Here it lives on water-plants and the young shoots of trees. In winter it retires to the uplands, and feeds on the twigs and bark of maple and other trees. It moves with a trotting, running, and jumping motion, with great speed, and is an excellent swimmer. Its sense of smell is very acute, and its hearing equally so, since the least sound of a breaking twig startles it. The males fight furiously in the pairing season, and are then dangerous to approach. The moose has been domesticated, and proves very tractable, though it is apt to become uncontrollable in the rutting season.

The flesh of the moose is coarse, but is much esteemed by hunters. The steaks are juicy and often tender, the tongue much relished, and the nose a special delicacy. It is, therefore, much hunted, the principal hunting seasons being in March and September. March is chosen from the fact that the thinly-crusted snow is then broken through by the weight of the moose, which can thus be easily overtaken. It cannot be run down in soft snow. Yet if the snow be very deep, the moose may be followed and overtaken by the hunter on snow-shoes. If wounded and at bay the moose will fight furiously, using its fore-feet and horns sometimes with fatal effect. In September it is shot from canoes on moonlight nights. The hunter imitates the call of the male, and brings hostile males in rapid flight to the water's edge, furious to fight. Here they meet the bullet of the hunter instead of their expected foe. (C. M.)

MORAN, Edward, an American painter, was born at Bolton, England, in 1829. He removed to Philadelphia in 1844, studied art under Hamilton and Weber, and first exhibited in 1853. In 1862 he went to Europe, in 1869 took up his residence at New York, but in 1877 settled in Paris. He is specially noted as a marine painter, but in later years has turned to figure painting. Among his works are Launch of the Life-Boat, The Lord Staying the Waters, Outward Bound, and many views of New York Bay. He has also illustrated many books.

His brother, Thomas Moran, was born at Bolton, England, Jan. 12, 1837. Coming to America he was apprenticed to an engraver at Philadelphia, and commenced painting water-color landscapes in 1856. He visited Europe in 1861 and studied the paintings of Turner. In 1871 he accompanied Prof. F. V. Hayden's expedition to the Yellowstone River, and in 1873 Major Powell's expedition to the Colorado River. As a result of these journeys he painted The Grand Cañon of the Yellowstone, and The Chasm of the Colorado, which were both purchased by Congress for the Capitol. In 1872 he settled in New York. Among his works are The Last Arrow, The Mountain of the Holy Cross, The Remorse of Cain, The First Ship, A Ride for Life. He has also made many illustrations for books.

Another brother, **Peter Moran**, was born at Bolton, England, March 4, 1842. After studying art with his brother Thomas, he went to England in 1863, and studied the English masters. He settled in Philadelphia and has devoted himself chiefly to animal painting. Among his works are The Return of the Herd (which obtained a medal at the Centennial Exhibition in 1876), A Settled Rain, Sand Hills, Atlantic City, After the Chase. He has also made excellent etchings.

MORATA, Olympia Fulvia (1526–1555), an Italian lady, noted for her learning, was born at Ferrara in 1526. She was the daughter of Fulvius Peregrinus Moratus, a learned professor, born at Mantua, who was tutor of the sons of the Duke of Ferrara. She also received from her father a careful training, and as early as her sixteenth year gave instruction to others in classics. Under the influence of the new learning she adopted the principles of the Reformation. She was married to Andreas Grunthler, a German physician, and with him removed to Schweinfurt. In 1553, when that town was captured by Margrave Albrecht, of Brandenburg, her library was plundered and much of her writing destroyed. Her husband was afterwards professor at Heidelberg, and here she died, Oct. 26, 1555. Her published works were critical observations on Homer and Cicero, Greek and Latin *Dialogues* and *Poems*. There have been many editions of her works and biographies in several languages. In English the principal biography is R. Turnbull's *Olympia Morata* (Boston, 1846). See also T. A. Trollope's *Decade of Italian Women* (London, 1860).

See Vol. XVI. p. 837 Am. ed. (p. 811 Edin. ed.).

MORAVIAN CHURCH. The official name of this church is *Unitas Fratrum*, or Unity of the Brethren, adopted soon after its founding in Bohemia in 1457, and reintroduced on the occasion of its recognition by the Parliament of Great Britain in 1749. There are two great periods in its history: the first embracing the time of the Ancient Unitas Fratrum, from 1457 to 1722; the other, the time of the Renewed Unitas Fratrum, from 1722 to the present day. The idea, based upon the Spenerian principle of an *ecclesiola in ecclesia*, that the Moravians constitute a little church within the church, does not exist in Great Britain or the United States, and is rapidly waning in Germany. American Moravians look upon their church as the legitimate continuation of the Ancient Unitas; as the oldest Protestant church that exists, excepting the Waldensian; as the only one that is organically united throughout the world; as specially ordained to carry the gospel to the heathen, which missionary work, in the case of nearly every tribe that it includes, was inaugurated by descendants of the early Bohemian brethren; as embracing a historic ministry with its unbroken line of 172 bishops from 1467 to the present day; and as appointed to further, in all proper ways, "the unity of the Spirit in the bond of peace" among evangelical Christians of every name. This catholic tendency to fraternize and endeavor to bring about a fulfilment of Christ's high-priestly prayer, "that they all may be one," has distinguished the Moravians in every period of their history, resulting in Poland in the celebrated *Consensus Sendomiriensis* of 1570, by which the Protestant churches of that kingdom were united in one confederation, and effecting in 1742, although but for a little while, a union among the German churches of Pennsylvania. At the same time, however, the Spenerian principle exercised a very great influence when the Unitas Fratrum was renewed, and, while fellowship with other Christians was freely continued, laid upon its own members the trammels of a peculiar system of exclusivism. Towns were founded in which none but Moravians were permitted to own real estate, which were under the immediate control of the church, from which were excluded the vanities and gross sins of the world, and in connection with which were instituted fraternities and sisterhoods that furnished the means for gaining a decent livelihood, as also for furthering personal religion and preparing for work in the kingdom of God. A necessary result of this system was to keep the church at home small on principle. Nevertheless such towns became centres of great influence and furnished the resources for a wide activity; through their numerous boarding-schools for young people not connected with the church; through a home mission on the continent of Europe, called the *Diaspora*, whose aim is to evangelize not to proselytize, and which still exists, having about 80,000 members; and through a foreign mission that has extended to nearly all parts of the earth. Moreover, in that period of rationalism which darkened Germany for many years, the faith centring in Christ as the Son of God and the atoning Saviour of the world continued to enlighten these towns, so that, as a distinguished church historian forcibly says, "in them the old Christ found a sanctuary." The exclusive polity, in a modified form, still prevails in Germany. In the event, however, of a disestablishment of the state church radical changes will take place; for such a disestablishment will at once induce the *Diaspora Societies* to constitute themselves Moravian churches. In Great Britain the last vestiges of the exclusive polity are slowly disappearing; in the United States it has been abrogated altogether.

The first American Moravian settlement was begun in 1735, at Savannah, in Georgia. In 1740 it was relinquished, and a new enterprise inaugurated in Pennsylvania, where Bethlehem, Nazareth, and Lititz were founded, and subsequently Salem, in North Carolina. These were exclusive Moravian towns on the German model, and kept up their peculiar system for a century. In addition, a number of other congregations arose not subjected to this system; but even in them its influence was felt. Down to the time of the Revolutionary war an extensive home missionary work was maintained, embracing nearly all the thirteen original colonies, in which Moravian evangelists preached the gospel and otherwise ministered to the settlers, but rarely attempted to organize Moravian churches. A prosperous mission among the Indians was also established. The history of this undertaking is full of dramatic incidents and of wonderful examples of the converting power exercised by the gospel. The work began in New York and New England, flourished in Pennsylvania, and reached the acme of its success in Ohio, where the distinguished missionary, David Zeisberger, who labored among the aborigines for 62 years, established a number of Christian Indian towns, in which the Indian question was satisfactorily solved. During the French and Indian war, in 1755, 11 Moravian missionaries were massacred by the savages, at Gnadenhuetten, in the Lehigh Valley of Pennsylvania. During the Pontiac conspiracy the Moravian Indians, as they were called, would have been exterminated by the infuriated inhabitants of Lancaster county if the government had not protected them in the barracks at Philadelphia. During the Revolutionary war, in 1782, 90 Christian Indians were slaughtered in cold blood, at Gnadenhuetten, in the Tuscarawas Valley, of Ohio, by a party of American militia. This was a blow from which the cause has never recovered.

In 1844 and the following years the exclusive polity was abrogated in the United States, and the Moravian towns were thrown open; since which time they have become flourishing boroughs, Bethlehem and South Bethlehem counting 15,000 inhabitants and 19 churches of various denominations. Hence the American Moravian Church now carries on its work according to the same principles as other churches, extending and organizing wherever it can, especially among the German immigrants of the West. At the same time that century of exclusivism in its history, during which other denominations spread, while its polity prevented it from spreading, is the reason why, even at the present day, it remains comparatively so small. It has 1 theological seminary at Bethlehem, founded in 1807; 4 boarding-schools at Bethlehem, Nazareth, and Lititz, in Pennsylvania, and at Salem, in North Carolina; and issues 2 weekly church papers and a monthly Sunday-school paper from its publication office at Bethlehem. The same office publishes the American edition of the *Text-Book*, an annual containing a text from the Old Testament and another from the New, to which texts are appended appropriate stanzas from the hymnal for every day in the year. This little work is now in the 156th year of its publication, and appears in English, German, Bohemian, French, Spanish, Dutch, Swedish, Danish, Esquimaux, and negro-English languages, having a circulation of about 75,000 copies annually.

The enterprises which the Unitas Fratrum carries on in common are the Bohemian mission and the mission among the heathen. The former is a new undertaking in the original Bohemian seats of the church. It is growing and full of promise, having recently reached Prague, the capital of the country. According to the latest statistics, the foreign missionary work embraces the following countries: Greenland, Labrador, United States and Canada (among Indians), Western Alaska, eight islands of the West Indies, Demerara in British Guiana, Mosquito coast, Surinam, Bushland, South Africa, Australia, and Thibet. In these countries there are laboring 310 missionaries, male and female, 9 assistants, and 1602 native assistants, the number of converts being 81,553. The annual cost of the work is about $250,000. In 1889, according to the enactment of the last General Synod, the entire field in the West Indies is to be severed from the foreign mission work, and to be formed into a fourth self-supporting home province of the Unitas Fratrum. The most recent statistics show that the three existing home provinces number 31,719 members, of whom about 20,000 are communicants. Hence the total number of souls connected with the Unitas Fratrum is 113,272.

Literature: Bishop E. de Schweinitz's *History of the Unitas Fratrum* (Bethlehem, 1885), the latest work on the subject; Croeger's *Geschichte der alten und erneuerten Brüderkirche* (5 vols., Gnadau, 1852–1866); La Trobe's Cranz's *History of the Brethren* (London, 1780); Burkhardt's *Zinzendorf und die Brüdergemeine* (Gotha, 1866); Loskiel's *History of Mission among the Indians* (London, 1794); Schweinitz's *Life and Times of David Zeisberger* (Phila., 1870); Heckewelder's *Narrative of the Indian Mission* (Phila., 1820). (E. S.)

MORGAN, Daniel (1736–1802), an American general, was born in Hunterdon co., N. J., in 1736. He removed to Virginia in boyhood, and in 1755 became a wagoner in Braddock's expedition. In 1756 he knocked down a British lieutenant for insulting him, and was punished with 500 lashes. He afterwards served in the militia, and in 1758 was made an ensign. In youth he was fond of rough life, and had some narrow escapes from the Indians. Before the Revolutionary war he had become a substantial farmer. On the outbreak of this war he enlisted a company, with which he marched to Boston. Here he joined Arnold's expedition to Quebec, and, after suffering great hardships, was made prisoner in Canada. On being exchanged, he was appointed, Nov. 12, 1776, colonel of a rifle corps which became celebrated. He served with Gen. Gates in September, 1777, and was distinguished at Saratoga. He afterwards joined Washington near Philadelphia. He resigned his command in June, 1779; but after the defeat at Camden, joined Gen. Gates' army, and Oct. 13, 1780, was commissioned a brigadier-general. Under Gen. Greene he held a detached command, and on Jan. 17, 1781, won a brilliant victory over Col. Tarleton at Cowpens. (See Vol. II., p. 451.) He was soon compelled by rheumatism to retire from service. In 1794 he commanded the army sent to suppress the Whisky Insurrection in Western Pennsylvania, and in 1795 he was elected to Congress, where he served as a Federalist until 1799. In 1800 he settled at Winchester, Va., where he died, July 6, 1802.

His nephew, Charles W. Morgan (1790–1853), was a prominent naval officer, and commanded the Mediterranean squadron 1841–43.

MORGAN, Edward Dennison (1811–1883), an American statesman, was born at Washington, Mass., Feb. 8, 1811. In 1828 he became a clerk in a grocery store at Hartford, Conn., and in 1831 he was made a partner. In 1836 he established himself in business in New York city. He was elected to the State senate in 1843, and held this place ten years. On the formation of the Republican party he was one of its most active members, and in 1859 he was elected governor of New York. During the trying times of the civil war he discharged his very responsible duties with patriotic zeal, energy, and efficiency. He received the honorary rank of major-general of U. S. volunteers in 1861. He was elected to the U. S. Senate in 1863, and at the end of his term retired to private life. He died Feb. 14, 1883.

MORGAN, George Washington, an American general, was born in Washington co., Pa., Sept. 20, 1820. In 1836 he went to Texas to take part in the war for independence, and rose to the rank of captain. He afterwards studied at West Point for two years, but in 1845 became a lawyer at Mount Vernon, Ohio. In 1846 he became colonel of a regiment of Ohio volunteers, and in March, 1847, was made colonel of the Fifteenth U. S. infantry. He received the brevet of brigadier-general for gallantry at Contreras and Cherubusco, where he was severely wounded. He was appointed U. S. consul at Marseilles, France, in 1856, and resident minister at Lisbon in 1858. Returning to Ohio in 1861, he was made brigadier-general of volunteers in November. He commanded the seventh division of the Army of the Ohio, and seized Cumberland Gap (see Vol. II., p. 491), but was afterwards compelled to retreat. He served afterwards under Gens. Rosecrans and Sherman, and resigned in June, 1863. He was a member of Congress from 1868 to 1872.

MORGAN, John Henry (1826–1864), an American general, was born at Huntsville, Ala., June 1, 1826. While a child he was taken to Kentucky. He was a lieutenant of cavalry in the Mexican war, and was afterwards a manufacturer at Lexington, Ky. In September, 1861, he raised a rifle regiment and entered the Confederate service under Gen. Buckner. At Shiloh he commanded a squadron of cavalry, and soon after began a series of raids in which he destroyed an immense amount of military stores as well as bridges and railroads. In 1863 he made his boldest raid, crossing Indiana and Ohio, but he was captured, with most of his men, and confined in the Ohio Penitentiary. Hence he escaped, and afterwards he undertook a raid in Tennessee, but was surprised by Union cavalry at Greenville, and killed while attempting to escape, Sept. 4, 1864.

MORGAN, Lewis Henry (1818–1881), an American archæologist, was born near Aurora, N. Y., Nov. 21, 1818. He graduated at Union College in 1840, and became a lawyer at Rochester in 1844. He was elected to the N. Y. assembly in 1861, and to the senate in 1868. He died Dec. 17, 1881. While a young man Morgan had joined a society which professed to preserve the usages of the American Indians. This led him to make original investigations of their social customs, and the result appeared in his *League* *of the Iroquois* (1851). After publishing *The American Beaver and his Works* (1868), he resumed his investigations into family and tribal customs among savages, with the aid of the Smithsonian Institute. He published *Systems of Consanguinity and Affinity of the Human Family* (1870); *Ancient Society* (1877); *Home Life and Archæology of North American Indians* (1881). These works are important contributions to the study of the primitive condition of the human race and its development. See Aztecs.

MORGUE. This word was originally given to the court or entry of a prison, where prisoners whom it was necessary to identify were exposed for some time to public inspection. Later this became the place for exposure of bodies found dead, that needed identification. In 1804 the morgue in the Chatelet prison, Paris, was removed to a separate establishment. This was enlarged in 1830, and in 1866 another was opened, near the Seine, and behind Notre Dame Cathedral. Here the bodies are exposed on a marble slab, naked except for a leather band across the middle, while streams of water flow over the slab, and other means to check decomposition are used. A glazed partition permits the public to inspect the body. The clothing is also exhibited. The average time of exhibition is 24 hours. The majority are recognized.

Morgues have since been established in all the principal cities of Europe and the United States. The Boston morgue was opened in 1851. That of New York, on the grounds of Bellevue Hospital, was established in 1866. The Brooklyn morgue, claimed to be the best appointed in the country, was opened in 1870. The Philadelphia morgue building, at the foot of Noble street near the Delaware, was erected in the same year. In Chicago a morgue was opened on the grounds of Cook County Hospital in 1872. They have been since established in the other principal cities. The bodies of the unknown dead are given to the medical colleges for dissection in Chicago and Philadelphia, but not in the other cities named. As an instance of their work we may state that more than 400 bodies are exhibited at the Philadelphia morgue annually. Of these about 10 per cent. remain unrecognized. The time of exhibition is 72 hours. In this institution public exhibition is not allowed, only those seeking to identify the body being permitted to see it. This regulation is a wise one, as it acts to check the morbid curiosity of idle spectators. (C. M.)

MORLEY, Henry, an English author, was born at London, Sept. 15, 1822. He studied at a Moravian School, in Germany, and graduated at King's College, London. He practised medicine in Shropshire from 1843 to 1848, and in the meantime began to publish articles on public health. In 1851 he became assistant to Dickens in editing *Household Words*, and from 1856 to 1859 was joint editor of the *Examiner*, becoming afterwards sole editor. In 1859 he was made professor of English literature in King's College, and in 1865 in University College. Here he endeavored to procure the admission of women as students. He has published some volumes of tales and poems, and biographies of Bernard Palissy (1852); Jerome Cardan (1854); Cornelius Agrippa (1856); Clement Marot (1871). He has also published a *History of Early English Literature* (1864–67), and a *First Sketch of English Literature* (3 vols., 1873).

MORLEY, John, an English author, was born at Blackburn, Lancashire, Dec. 24, 1838. He graduated at Lincoln College, Oxford, in 1859, having already published some critical essays of great power. He wrote for the *Saturday Review*, and in 1867 became editor of the *Fortnightly Review*, which was intended as a vehicle for the untrammelled expression of opinion on questions of the day. Morley showed himself extremely radical on both political and religious questions, a secularist and a republican. Among his publications in book form are *Edmund Burke* (1857); *Critical Miscellanies* (1871–77); *Voltaire* (1872); *Limits of the Historic Method* (1873); *On Compromise* (1875); *Rousseau* (1876); *Diderot and the Encyclopædists* (1878); *Life of Cobden* (1881). In 1886 he was appointed secretary for Ireland in Mr. Gladstone's cabinet.

See Vol XVI. p. 852 Am. ed. (p. 825 Edin. ed.).

MORMONS call themselves "The Church of Jesus Christ of Latter Day Saints." Their doctrines, mostly borrowed from older forms, may be briefly stated as follows: Both matter and spirit are eternal, and both are possessed of intelligence and power to design. The terms matter and spirit are used by way of accommodation to our limited faculties; for in reality they are so nearly identical and so intimately combined in all structures and organisms that it is impossible to distinguish between them. The gods originated in the spiritual realm, and are traced back to one Supreme Deity who is their literal father. This Supreme Deity and all the gods differ from men only in the fact that they are immortal. They are in form and fashion the same as man, having every organ and limb that belong to humanity. They have many wives, are as numerous as the sands upon the sea-shore, and are constantly increasing. Among the gods Jesus Christ holds the first place, being the "first begotten" and the "express image" of the Supreme Deity. A general assembly of the gods, presided over by the Supreme Deity, is the designing and creating power. Then this world was created and Adam and Eve taken from the family of gods and placed in it. In the fall they lost all knowledge of their heavenly origin, became possessed of mortal bodies, and only regained what they had lost through the quickening of the Holy Spirit and continued progress in knowledge and purity. Among the other creations of the gods are innumerable spirits which can only attain to the rank and honor of gods by the rugged road of discipline and trial trod by our first parents. These are constantly hovering over our earth waiting for fleshly tabernacles in which to begin the steep ascent. As soon as a child is born one of these spirits takes possession of it, and is then fairly launched forth upon its heavenly voyage. Those who do not listen to the teachings of the church here, will at death enter upon a third estate or probationary sphere, when they will have another opportunity, which if they improve aright, they will with all the faithful enter upon the fourth estate, which is the estate of the gods. The Holy Spirit is a material substance filling all space. Though under the control of the Supreme Deity, it is of itself possessed of knowledge, charity, and justice; can, when occasion requires, take on a body and perform all the wonders of the Supreme Deity; is the only part of the Deity that is omnipresent; in animals it is instinct; in man reason and inspiration, enabling him to prophesy, speak with tongues and perform miracles of healing, and many other wonderful things. This wonderful substance or fluid, like electricity, can be imparted through the laying on of hands by a priesthood properly constituted and duly authorized.

From this doctrinal system of gross materialism spring the two prominent features of Mormonism: polygamy and lust for power. Polygamy, though not at first a part of the system, is a natural outgrowth of its completed doctrine. This makes salvation not so much a matter of character as of family; for, as all Mormons expect to become gods, their glory will be in proportion to the number of their subjects. Thus Apostle Orson Pratt says: "If men neglect this sealing they will be damned to all eternity. If they are not sealed to their wives they cannot become gods and reign upon thrones, but will be servants to others." The same teaching, though more offensively stated, abounds in the sermons of Brigham Young, George Q. Cannon, Heber Kimball, and in fact, in the writings of all leading Mormons. They assert that Jesus Christ owes to this his present exaltation. It is because he had many wives that "he sees his seed," and that "a portion with the great" will be "divided" to him.

Social life among the Mormons may be judged of from the Mormon estimate of woman. She exists not by reason of her own individuality, but as a necessity in man's exaltation and glory. Her only hope of future life depends upon her being joined in "celestial marriage" to some man. Thus joined she will have some small share in her husband's glory. In marrying her, her husband confers upon her the greatest possible honor, and for this she ought willingly to submit to the veriest drudgery, and be her husband's ready and obedient slave. In order that she may be contented with her lot as a polygamous wife, she is taught from childhood to look upon conjugal love as a weak and foolish sentiment, and upon marriage as the only way to secure her present advancement and future felicity. In this way young girls are made willing to marry old and repulsive looking men, sisters to be "sealed" to the same husband, and even widows with their young daughters to enter into the same polygamous relations. Thus her nobler faculties and womanly instincts are destroyed, and she becomes wholly unfitted for the duties of a wife and mother. In the small and remote settlements, where the system is free from the influence of Christian civilization, it is not uncommon to find families with from two to six wives, with a score of grown and half-grown children living in a house with only one or two rooms, the whole herding together like so many cattle or swine. The children, boys and girls together, sleep upon the floor, and not infrequently in summer among the hay and straw in the barn.

Lust for power is inherent in the Mormon system. Apostle Pratt says: "The kingdom of God is an order of government established by divine authority. It is the only legal government that can exist in any part of the universe. All other governments are illegal and unauthorized. Any people attempting to govern themselves by laws of their own making and by officers of their own appointment are in direct rebellion against the kingdom of God." Thus it will be seen that the Mormon idea is, that they are not in rebellion, but engaged in suppressing a rebellion. And how completely they are organized for their work the following figures will show. The affairs of this "kingdom of God" are managed wholly by the priesthood, which is the medium of communication between it and the Almighty. This priesthood numbers as follows: first presidency 3, apostles 12, patriarchs 68, high-priests 3413, seventies 4747, elders 12,191, priests 1611, teachers 1786, deacons 5022, or a total of 28,853. And how vigorously and persistently they have prosecuted this work of "suppressing a rebellion" will be seen by an allusion to their history. In 1834 we find Smith marching westward at the head of an army, in true Mohammedan style, "to throw down the towers of their enemies and scatter their watchmen." And Brigham Young, his successor, as head of the priesthood, in 1847 gathered 30,000 followers, and leading them across the Rocky Mountains proceeded to establish a "free and independent government by the name of the State of Deseret." This priest-kingdom, which was to "break in pieces and consume" the rebellious government of the United States, extended to the Pacific on the west, to the Columbia River on the north, to the Rocky Mountains on the east, and to Mexico on the south. In 1850 a "general assembly" composed of the priesthood was convened, which proceeded to confer upon the "kingdom" the power to own and control unlimited wealth, to "establish rules, laws, and criterions for its government," "to punish and forgive offences," and "to solemnize marriage compatible with the revelation of Jesus Christ." Brigham Young declared, June 17, 1855: "Rather than that apostates should flourish here, I will unsheath my bowie-knife and conquer or die." According to the confession of Bishop John D. Lee, Young advised and helped plan the Mountain Meadow massacre two years later. In the same year Apostle John Taylor, now the head of the church, said: "If President Young wants a thousand men they will be ready in one day. Is it not so, brethren?" And thousands of voices answered, "Yes." In 1859 Judge Cradlebaugh attempted to hold court at Provo, but, after trying in vain to get the grand jury to indict persons who had been guilty of the most shocking crimes, he adjourned the court, and entered upon its docket: "The whole community presents a united and organized opposition to the administration of justice." Then came the war of the rebellion, and the church publicly proclaimed "that the government had been smitten by Divine wrath for its oppression of the saints." In 1866 Mr. Brassfield and Dr. Robinson were shot in the streets of Salt Lake City. In 1870 "Lieutenant-General" Daniel H. Wells, a prominent Mormon, was found in command of the "Nauvoo legion," numbering 13,000, and ready to smite the enemies of the Lord "hip and thigh." Soon after, George Q. Cannon, a four-wived saint, was sent as delegate to Congress, 'as Young styled it, to cram polygamy down the throat of the United States." While in Congress Cannon publicly avowed his crime, and declared his intention to continue to practise it in spite of all opposition.

Action of the U. S. Government in Regard to Mormonism.—Laws against polygamy in Utah and the other Territories over which the United States have exclusive jurisdiction have existed for twenty years, but they were constantly violated with impunity. In the eighteen years preceding 1881 only two convictions were had in Utah under the laws making polygamy a crime. The Mormons, composing so large a majority of the population of the Territory, were able to nullify the laws by controlling the territorial courts and the legislature, and by adopting secret methods of "sealing" wives to themselves. An accused polygamist was sure of finding at least a portion of the jury friendly to him, and the witnesses were frequently unwilling from fear or the influence of social surroundings to testify against the accused man.

Successive laws had been passed only to be violated, but in 1881 there were special indications of public sentiment against the further existence of polygamy in the United States. Public meetings, especially of religious associations, passed resolutions requesting vigorous action by Congress. At Salt Lake City itself the clergymen of non-Mormon churches and prominent Gentiles signed an urgent protest against the continuance of the evil. On the other hand petitions from Mormons, both men and women, were extensively signed protesting against rigorous laws.

Pres. Arthur, in his first message sent to the Forty-seventh Congress in 1881, called attention to the public sentiment which had been aroused against the existence of this custom among the Mormons, and urged that legislation be had to remedy the evil. Senator George F. Edmunds, of Vermont, introduced early in the session a bill which afterwards became a law and which is known as the Edmunds bill.

The bill provided for the punishment of bigamy and polygamy in the Territories of the United States, the fine not exceeding $500 and by imprisonment for not more than five years. To overcome the difficulty that was often experienced in obtaining proof of the actual marriage of a Mormon it was provided that a male person in any Territory or place over which the United States had jurisdiction, who cohabits with more than one woman as a wife, shall be punishable by imprisonment for not more than six months, or by a fine not exceeding $300, or by both fine and imprisonment. On trials for bigamy, polygamy, or unlawful cohabitation, the law provided that talesmen summoned to serve on the jury might be challenged on the ground that they were polygamists or believed in polygamy. It was also provided that polygamists and their wives should be denied the right to vote, and, as it had been shown that the Mormon election officers were unwilling to carry out such a provision, the President was authorized to appoint a commission of five members who should supervise the elections in the Territory of Utah. All registration and election officers were to be removed, and the commission was given power to transact all necessary duties relating to the registration of voters, the conduct of elections, the receiving and rejection of ballots, the canvassing and returning of the votes, and the issuing of certificates of election.

This radical law met with some opposition in Congress from senators and representatives who considered the withdrawal of the right of suffrage from the polygamists as unlawful, and who thought that the law interfered with observances of religion. It, however, passed both houses of Congress by large majorities and became a law. The commissioners appointed under the law were Alexander Ramsey, A. S. Paddock, G. L. Godfrey, A. B. Carlton, and J. R. Pettigrew.

The commissioners proceeded to Utah in August, 1882, and after removing all the old election officers, appointed new ones, who superintended the election of a delegate to Congress in 1882. The total number of registered voters was 33,266, of whom 18,772 were males and 14,494 females. John T. Caine, a monogamist Mormon, was elected by a vote of 23,039, against 4884 for the Gentile candidate. The local officers elected were all monogamists, and 12,000 men and women who were known to be polygamists were excluded from the privilege of voting.

The commissioners at first believed that the effect of the law had been great, and reported that the number of plural marriages had decidedly decreased. Later reports, however, are to the effect that the preaching of polygamy is more bold than ever, and that since the completion of a temple at Logan, the most important city in the northern part of Utah, the number of polygamous marriages had increased.

The Edmunds law has been effective in securing convictions of many persons accused of polygamy. Some of the accused Mormons have declared their guilt and gone to prison readily, or paid their fines. while others have been convicted on trial. Experience has shown that it is possible under this law to secure convictions by excluding all professed polygamists, or believers in polygamy, from the jury-box. The vigorous efforts of the Mormon authorities have been of little avail, and a serious defection seems to have taken place among the Mormons themselves, some of whom are in favor of an abandonment, for the present at least, of the practice of polygamy. The conviction of several persons accused of conspiring to bring discredit on the accusers of polygamists in Salt Lake City, the arrest of prominent church officials, and the refusal of the courts to naturalize polygamous Mormons, have discouraged some of those who formerly believed in polygamous marriages.

The Utah commissioners have, from time to time, in their reports to the secretary of the interior, recommended several changes in the Edmunds law, especially amendments allowing the first wife of a polygamist to testify on his trial, and doing away with woman suffrage. Although it has been found that many of the women, whom it is impossible to prevent from voting under the law, have been persuaded into a belief in polygamy and will vote according to the wishes of the Mormon authorities, some Senators who opposed polygamy but favored woman suffrage refused to vote for the amendments. A measure has been introduced in Congress and has passed the Senate, to abolish female suffrage in Utah, and to make changes in the law relative to the testimony in the cases of persons accused of polygamy. The Edmunds law has been sustained by the U. S. Supreme Court on appeal by Rudger Clawson, who was convicted of polygamy in Utah in 1883.

Mormon Immigration.—The Mormon Church has been largely recruited by immigrants who have been brought into Utah through zealous missionaries who have been sent to other parts of this country and to Europe. The church provides that the missionaries shall be sent out in "quorums" of 70 members each, in professed imitation of the seventy sent out by Christ to preach. Each quorum has 7 leaders, of whom one is the chief. There are now 82 of these "quorums," or nearly 6000 missionaries. They leave their homes in Utah on receiving directions from the church authorities, and go to any part of the world to which they may be directed. They pay their own expenses, or collect the money for their sustenance from the converts. They are lodged by friendly hosts and are supposed to make no provision for their support beyond their immediate wants. The missionaries usually travel in pairs, and preach for the most part in ignorant communities. They are as a rule plausible, ready of speech, and exceedingly zealous, and they are successful in winning converts. These missionaries are not all sent out in each year, but there are usually several hundred in the field. Eight hundred have been sent out in five years, of whom 111 went to the Southern States and 173 to other parts of the American continent. Great Britain received about 200 and the Scandinavian states about 100. A few went to New Zealand and the Sandwich Islands. It is estimated that between 75,000 and 100,000 immigrants have gone to Utah under the leadership of Mormon elders. The organization of the missionary force is very complete and effective.

The countries from which the immigrant converts to the Mormon faith have mainly come are England and the Scandinavian states. The north of England has furnished an especially large number of converts to Mormonism. Efforts to propagate the faith have been made in Spain, Germany, and other countries, but have not been as successful. Many missionaries have labored in Canada, and have met with much success. Efforts have been made to propagate Mormonism in the Southern States, and the missionaries sent thither were successfully prosecuting their labors until the hostile legislation of 1882 and the subsequent conviction of polygamists discouraged intended settlers from emigrating to Utah.

Mormon immigration is aided by an immigrant fund maintained by the church. The expenses of members of the church in Europe who desire to go to Utah are often paid by the agents of the church, but on the arrival of the immigrants in Utah they are frequently obliged to agree to refund the money advanced to them. The immigrants are closely watched as they gather from various parts of Europe to Liverpool, the usual place of embarking. They are kept while on the voyage under the observation of the elders, and special care is taken that no opportunity is given for their conversion to another faith. The immigrants, though for the most part ignorant, are always able-bodied, and are usually industrious, frugal, and obedient to discipline. They come to this country in parties of about 400 or 500 persons each. An emigration agent, who for several years has been J. H. Hart, is maintained at the port of New York, to receive the immigrants and assist them in reaching Utah. There are usually 3 or 4 parties of Mormons received at New York in each season, and the average yearly immigration has recently been over 2000 persons.

The U. S. secretary of state, in 1879, in pursuance of the direction of Congress, sent a circular letter to the American ministers in Europe, instructing them to call the attention of the governments to which they were accredited to the enactments against polygamy, and to ask them to prevent the preaching of Mormon doctrines and the emigration of bodies of professed Mormons. The British, Norwegian, Danish, Swedish, and German governments were thus appealed to, but the reply usually received was that the governments could not agree to inquire into the religious beliefs of the emigrants.

No exact statistics of the number of Mormon immigrants, as such, have been kept. Practically all of the immigrants who arrive at New York and announce that they intend to go to Utah are Mormons The intended destinations of the immigrant passengers who arrive at New York are recorded, and from these it appears that the number of persons who designed to reside in Utah and who may be taken as Mormon immigrants were, in the last six years: 1880, 1795; 1881, 2323; 1882, 2732; 1883, 2640; 1884, 1893; and in 1885, 1788.

Present Condition.—Mormonism has lately spread with great rapidity into the State of Nevada and into Montana, Idaho, Wyoming, and other Territories. The members of the Mormon Church, even if they do not practise polygamy, are all, if they hold orthodox views, believers in the doctrine of polygamy as a divine revelation. Their influence in the Territories is consequently exerted to prevent the enactment of laws against polygamy. The governor of Idaho, in a message to the legislature a few years ago, intimated that the influence of polygamous Mormons had been great enough to prevent the passage by the legislature of laws to suppress polygamy. In speaking of the Edmunds law he added, "It is no exaggeration to state that in two or more counties in this Territory polygamists vote and hold office precisely as though no such law was upon the statute books. In other Territories and in the State of Nevada the Mormon element has become large enough to be important in public affairs.

The Territory of Utah now has a population exceeding 160,000; of these probably 110,000 are Mormons. The number of registered voters in 1884 was over 40,000. Other States and Territories have considerable numbers of persons of Mormon faith, and they are numerous in England. It is believed that the members of the Mormon church number at least 250,000. Statements have frequently been made that the Mormons were preparing to change their place of residence from Utah to Mexico, or to some island in the Pacific sea, but no movement has yet been begun.

In all attempts at legislation thus far made, both the fact of Mormon disloyalty and criminality have been strangely overlooked. While the actual polygamists are less than one-tenth of the entire population, they include all the high officials, and so control Territorial legislation and all local and municipal affairs as completely as they did before the passage of the Edmunds act. The rule of the priesthood will be seen in the vote for delegate to Congress in 1883. In Cache county, Caine, Mormon, received 2226 votes, while Van Zile, Gentile, received 80; in Davis county, Caine, 944, Van Zile, 105; Rich county, Caine, 204, Van Zile, 4; and the total vote of the Territory stood, Caine, 23,119; Van Zile, 4838. From these figures it will be seen that the struggle between the Gentile population and the priesthood is a hopeless one. With such an overwhelming majority controlling all local affairs the execution of U. S. laws is impossible, and fierce conflicts between the two forces is the result. The United States have three judges, while the Mormons control sixty municipal and county courts. While the U. S. marshal and his six deputies try to bring criminals to justice, the Mormon church has 381 sheriffs and constables sworn to secrete and protect them. Then, besides these officers under pay, and to support whom Gentiles are liberally taxed, the whole church, under the leadership of the priesthood, presents, as Judge Cradlebaugh expressed it, "a united and organized opposition" to the execution of the law. Not only does the church appoint all the officers in the Territory, it also controls its revenues. Besides the revenue from tithing, which is estimated at over $1,000,000, fully $500,000 are raised by direct taxation. Of this latter amount $200,000 is expended for common schools. This is one of the most powerful auxiliaries of the Mormon Church. There are 411 schools, employing 491 teachers, and having 28,678 pupils. Of these teachers nearly all are Mormons, and hence under the control of the priesthood. A large majority of them know little but Mormonism, and hence their teaching is largely made up of the peculiar doctrines of the church. In this way the children of the Territory are being educated to become zealous defenders of the faith, and to support these Mormon schools Gentiles are made to pay their share. Through its efficient organization the church is now giving special attention to extending its power into neighboring States and Territories. The Mormon communities can always be counted upon to "vote solid," and the candidate that will promise to "show favor" to the church can always count upon their vote, and in the sparsely settled districts a "solid" vote of 50 or 100, and in some instances even of 20, will carry an election. In this way Mormons have practically controlled legislation in Idaho for the last ten years. In Nevada, Colorado, Arizona, Wyoming, and Idaho, they have regularly organized "stakes" or branches, and scattering settlements in the other States and Territories. Their object in thus extending their borders is plain. At the Mormon conference held in 1844 Brigham Young said: "It is time to have a President of the United States. Elders will be sent out to preach the gospel and electioneer." And however this purpose may be covered up, it is their ultimate design. At present a strong effort is being made to capture the State government of Nevada. Failing to secure State independence in Utah, they propose to secure a State where such independence already exists. And everything seems to favor the scheme. For several years the population of Nevada has been diminishing and at present it only polls about 15,000 votes. Meanwhile the Mormons have been steadily increasing, and when once they have secured a voting population outnumbering that of the two nearly equally divided political parties they will throw off the mask, and with two senators, and a voting representative in the lower house, they can make their political influence felt in the general government. More than this, they would then be free from Congressional interference and could carry on their polygamous practices without let or hindrance. The evils existing in Utah can only be remedied by taking everything like autonomy from the Territory. No law against polygamy can be generally executed as long as the Mormon priesthood is allowed to administer the large revenues of the Territory and fill the 972 offices now at their disposal. Let the elective franchise be taken from the people of the Territory and its affairs placed in the hands of officers appointed by the general government, all would be changed. Then men loyal to the government would be appointed to office, the non-Mormon population would be protected in their rights, competent teachers would be placed in the schools, and ignorance, upon which Mormonism thrives and fattens, would gradually disappear. (D. S. and J. P. D.)

MOROCCO. See LEATHER.

MORPHY, PAUL CHARLES (1837–1884), an American chess-player, was born at New Orleans, June 22, 1837. While a child he exhibited remarkable skill as a chess-player. He graduated at St. Joseph's College, studied law, and was admitted to the bar in 1857. At the chess congress held in 1857 at New York he was victorious over all competitors. In the summer of 1858 he went to London, where he defeated Löwenthal and others. At Paris he defeated the best French players, and finally Anderssen, the German champion. He had already shown his ability to play without seeing the board, and sometimes carried on seven games at once. He returned to the United States in 1859 and devoted himself to his profession in New Orleans, though residing occasionally at Mobile and Richmond. In his later years he expressed great aversion for chess, utterly refusing to play. He died July 10, 1884.

MORRIS, CHARLES (1784–1856), an American commodore, was born at Woodstock, Conn., July 26, 1784. He entered the navy in 1799 and served in the war with Tripoli. In the war of 1812 he was first lieutenant of the frigate Constitution, and was wounded in the action with the Guerriere, Aug. 19, 1812. Being made captain, he commanded the Adams, 28 guns, and cruised off the American and Irish coasts. While he was engaged in repairing his vessel in the Penobscot, in August, 1814, a British expedition came up to capture it and he was obliged to order its destruction. He was in command of the Brandywine, which conveyed Lafayette to France in 1825. He afterwards commanded a squadron, and in later life had charge of various bureaus in the navy department. He died at Washington, Jan. 27, 1856.

MORRIS, Francis Orpen, an English clergyman and naturalist, was born at Beverley, Yorkshire, March 25, 1810. He graduated at Worcester College, Oxford, in 1833, and was ordained in 1834. After holding other positions he was made rector of Nunburnhohne in 1854. He has published a *History of British Birds* (6 vols. 1851–67); *Nests and Eggs of British Birds; Natural History of British Butterflies; Natural History of British Moths; Bible Natural History; Records of Animal Sagacity; Dogs and their Doings* (1871); *County-seats of the Noblemen and Gentlemen of Great Britain.* He has also published some religious and antiquarian works.

MORRIS, George Perkins (1802–1864), an American journalist and poet, was born at Philadelphia, Oct. 10, 1802. In early life he removed to New York and began to write for the press. In 1823, with Samuel Woodworth, he established the *New York Mirror*, with which N. P. Willis was afterwards associated. This lasted with some change of name until 1844. In 1846 Morris established a weekly paper called the *Home Journal*, in which Willis afterwards took a prominent part. Morris wrote some tales, a drama called *Briercliff*, and the libretto of an opera, but his reputation rests upon his songs, among which "Woodman, Spare that Tree" is the most noted. He died at New York, July 6, 1864.

MORRIS, George Sylvester, an American philosopher, was born at Norwich, Vt., Nov. 15, 1840. He graduated at Dartmouth College in 1861, served a year in the army, and was tutor at Dartmouth, 1863–64. He studied theology and spent some years in Germany, chiefly in philosophical study. He was made professor of modern languages and literature in the University of Michigan in 1870, and in 1876 was called to lecture on philosophy in Johns Hopkins University. He has published a translation of Ueberweg's *History of Philosophy* (1871); *British Thought and Thinkers* (1875); and has edited a series of "German Philosophical Classics" for which he prepared *Kant's Critique of Pure Reason* (1882).

MORRIS, John G., an American clergyman, was born at York, Pa., Nov. 14, 1803. He graduated at Dickinson College in 1823, and studied theology at Princeton. He was ordained pastor of the First Lutheran Church in 1826, and held this position till 1859, when he became pastor of another church in the same city. He founded the *Lutheran Observer* in 1831, and was its editor for a year. He founded the village of Lutherville, near Baltimore, and organized there a seminary for young ladies. He was the first librarian of the Peabody Institute of Baltimore, and has been president of many scientific, literary, and religious societies. He has published a *Popular Exposition of the Gospels* (1840); *Quaint Sayings Concerning Luther; Life of Catharine Von Bora*, and *Life of Luther.* He has also translated several works from the German, and delivered courses of lectures on science and on the connection between science and revelation.

MORRIS, Richard, an English philologist, was born at Bermondsey, Southwark, England, Sept. 8, 1833. He was educated at St. John's College, Battersea. He early devoted himself to the study of the English language and its early literature. In 1869 he became lecturer on these subjects in King's College school. In 1871 he was ordained curate of Christ Church, Camberwell. He has been very active in the Chaucer, Early English Text, and Philological Societies, and in 1871 was made president of the latter. Among his publications are *Etymology of Local Names* (1857); *Specimens of Early English* (1867); *Historical Outlines of English Accidence* (1872). He has also edited for various societies the works of Chaucer, Spenser, and other early writers.

MORRIS, Thomas Asbury (1794–1874), an American bishop, was born in Kanawha co., Va., April 28, 1794. He was licensed as a Methodist preacher in 1814, and joined the Ohio M. E. Conference in 1816. After successful labor as an itinerant until 1834, he was appointed the first editor of the *Western Christian Advocate* at Cincinnati. In 1836 he was elected bishop, and discharged his duties with earnestness and success until disabled. He died at Springfield, Ohio, Sept. 2, 1874. He published a volume of sermons and *Sketches of Western Methodism* (1852).

MORRIS, William, an English poet, was born near London in 1834. His father, a merchant, dying in 1844, left him a large estate. He graduated at Exeter College, Oxford, and studied painting. In 1863, in company with others, he undertook the designing and manufacture of household decorations, and the business proved highly successful. Mr. Morris has published *The Defence of Guenevere* (1858); *The Life and Death of Jason* (1867); *The Earthly Paradise* (1868–71); *Love is Enough* (1873); *The Æneids of Virgil, done into English Verse* (1876); *Volsungs and the Niblungs*, a translation from the Eddas, in which he was assisted by Eirikr Magnusson (1870). Many of his poems are narratives drawn from Scandinavian mythology, and abounding in rich fancy.

MORRISTOWN, a city of New Jersey, seat of justice of Morris county, is on the Whippany River, 50 miles N.N.E. of Trenton, and on the Morris and Essex Railroad, 32 miles W. of New York. It occupies a picturesque site, surrounded by hills, and is neatly built. It has a court-house, an academy, a classical school, 2 ladies' seminaries, 9 churches, 2 national banks, 3 weekly newspapers, excellent public schools, gas-works, and a water supply. In the town park stands a granite soldiers' monument. The city has iron-works, paper-mills, and other manufactories. It is a pleasant summer resort. The place possesses much historic interest, and during the Revolutionary war was twice the head-quarters of Gen. Washington. Near Morris Plains, 3 miles to the N., stands the Morristown Lunatic Asylum, a very large State institution. In 1880 the city had a population of 5418.

MORSE, Edward Sylvester, an American naturalist, was born at Portland, Me., June 18, 1838. While employed as a draughtsman he studied zoölogy, and in 1859 became connected with the Museum of Natural History at Cambridge, Mass. In 1867 he was made curator of mollusca in the Boston Society of Natural History. He was professor of comparative anatomy and zoölogy at Bowdoin College from 1871 to 1873, and he also lectured on zoölogy at Harvard University. He has contributed many important papers to scientific journals and the transactions of societies of natural history.

MORSE, Jedidiah (1761–1826), an American clergyman and geographer, was born at Woodstock, Conn., Aug. 23, 1761. He was the father of Samuel Finley Breese Morse, the inventor of the electric telegraph (for whom see Encyclopædia Britannica). Jedidiah graduated at Yale College in 1783, and was licensed to preach in 1785, but remained a tutor at Yale in 1786. He was ordained pastor of the First Congregational Church at Charlestown, Mass. Just after graduating he had prepared a small geography, the first work of the kind published in America. From this gradually grew a series of important geographical works, which had extensive circulation in the United States, the larger ones being also reprinted and translated in Europe. Dr. Morse was a champion of the Orthodox Trinitarian faith against Unitarian innovators. In 1805 he established the *Panoplist*, a monthly religious periodical, which he edited until 1810. He took part in founding the Andover Theological Seminary, and succeeded in uniting on a common basis the opponents of the liberal tendency in religion. In 1820 he resigned his charge and was sent by the U. S. government to visit the Indian tribes in the North-west. He died at New Haven, June 9, 1826. Besides his geographies and *Indian Report* (1822), he published a *Compendious History of New England* (1804); *Annals of the American Revolution* (1824), and various sermons and addresses. His *Life* was written by Rev. W. B. Sprague, D. D. (1874).

His son, **RICHARD CARY MORSE** (1795–1868), was born at Charlestown, June 18, 1795. He studied at Phillips Academy, Andover, graduated at Yale College in 1812, and at Andover Theological Seminary in 1817. He assisted his father in his geographical works, and in 1823 joined with his brother, Sidney Edward Morse (1794–1871), in establishing the *New York Observer*. After thirty-five years' connection with this paper he retired in 1858, and took up his residence at New Haven. He died at Kissingen, Germany, Sept. 22, 1868.

MORTON, GEORGE, the author of the first history of Plymouth, Mass., was born at York, England, about 1585. He was one of the Pilgrims who settled at Leyden, Holland, where he married in 1612. After serving as London agent for the Pilgrims in 1620, he sailed for Plymouth in 1623; but returned some years later, and died in England. His book, called *Mourt's Relation* (1622), was the first book published in England giving an account of that colony. It was republished by Rev. H. M. Dexter (Boston, 1865).

His brother, **NATHANIEL MORTON** (1613–1685), came to America in 1623. He was secretary of Plymouth colony from Dec. 7, 1647, till his death, June 29, 1685. He compiled his *New England's Memorial* (1699) chiefly from his uncle, Gov. Bradford's, manuscripts. In 1680 he wrote an ecclesiastical history of Plymouth, which is preserved in Young's *Chronicles of the Pilgrims*.

MORTON, HENRY, an American chemist, was born at New York, Dec. 11, 1836, being son of Rev. Henry J. Morton, D. D. He graduated at the University of Pennsylvania in 1857. He studied law for two years, but afterwards gave his entire attention to physical and chemical science. In 1863 he became professor of chemistry in the Philadelphia Dental College, and in 1864 secretary of the Franklin Institute, Philadelphia, and in 1867 editor of its journal. His course of lectures on light in 1864 had attracted much attention. In 1869 he was elected professor of chemistry in the University of Pennsylvania, having already occupied the chair temporarily. In 1870 he was made president of the Stevens Institute of Technology, at Hoboken, N. J., then organized under a bequest of Edwin A. Stevens. This institute has obtained a high reputation through the scientific researches of its professors. Pres. Morton has published numerous papers in scientific journals.

MORTON, JAMES ST. CLAIR (1829–1864), an American engineer, was born at Philadelphia in 1829. He graduated at West Point in 1851, and entered the engineer corps. He was assistant professor of engineering at West Point in 1855, and in 1860 led an exploring expedition to Chiriqui, Central America. In 1861 he superintended the fortifications at the Tortugas, and in May, 1862, was made chief-engineer of the Army of the Ohio. He commanded the pioneer bridge-brigade of the Army of the Cumberland, and was made brigadier-general of volunteers Nov. 29, 1862. He was wounded at Chickamauga, and superintended the engineering operations around Chattanooga. In 1864 he served as chief-engineer of the Ninth army corps, and was killed while leading the assault on Petersburg, June 17, 1864. He published essays on engineering and fortification.

MORTON, JOHN (1724–1777), an American statesman, was born at Ridley, Pa., in 1724. He was a surveyor and justice of the peace, frequently elected to the Pennsylvania legislature, and speaker of the assembly, 1772–75. He was an active member of the Continental Congress, 1774–76, in which he signed the Declaration of Independence. He died in April, 1777.

MORTON, OLIVER PERRY (1823–1877), an American statesman, was born in Wayne co., Ind., Aug. 4, 1823. He was educated at Miami University, and admitted to the Indiana bar in 1847. He at once became active in politics as a Democrat, and in 1852 was appointed a circuit judge. On the formation of the Republican party, he entered its ranks, and in 1856 was its candidate for governor of Indiana, but was defeated. In 1860 he was elected lieutenant-governor, and soon succeeded to the gubernatorial chair. During the civil war he strenuously supported the national administration, and urged a vigorous prosecution of hostilities. In 1863, when the Democratic legislature attempted to hamper his actions, he borrowed money on his own responsibility to carry on the State government. In 1864 his course was sustained by the people, and he was re-elected by 20,000 majority. In 1865 he had a stroke of paralysis, which obliged him thereafter to use crutches. In 1867 he was elected to the U. S. Senate, entering that body during the struggle between Pres. Johnson and Congress in regard to the reconstruction of the Southern States, and soon after taking part in the impeachment of the President. Morton opposed the restoration of the former leaders of the South to political power, and insisted on the thorough suppression of disloyalty. He advocated the Fifteenth Constitutional Amendment and other measures to secure the results of the war. Morton was an earnest supporter of the administration of Pres. Grant, and in 1876 was one of the leading candidates for the Republican Presidential nomination. He was a member of the Electoral Commission in 1877. He died at Indianapolis, Nov. 1, 1877.

MORTON, SAMUEL GEORGE (1799–1851), an American craniologist, was born at Philadelphia, Jan. 26, 1799. He studied medicine, graduating at the University of Pennsylvania in 1820, and at Edinburgh in 1823. He entered on practice at Philadelphia in the next year, and was also active in the Academy of Natural Sciences. In 1830, as introductory to a course of anatomy, he delivered a lecture on the different forms of the skull as exhibited in the five races of men. Being unable then to obtain a specimen of either Mongolian or Malay, he resolved to make a collection, and, by the aid of over one hundred contributors, had gathered up to the time of his death 918 specimens of human skulls, besides 700 of lower animals. These were afterwards purchased for the Philadelphia Academy of Natural Sciences, of which he was president in 1840. From 1839 to 1843 he was professor of anatomy in the Pennsylvania Medical College, and he was also member of many learned societies. His most important publications were *Crania Americana* (1839), and *Crania Egyptiaca* (1844); and after his death some of his papers appeared in Nott and Gliddon's *Types of Mankind* (1854). Dr. Morton had adopted the view of the diverse origin of the human race, and engaged in controversy on this subject. He died at Philadelphia, May 15, 1851. Memoirs of him were published by Dr. C. D. Meigs and Dr. G. B. Wood.

MORTON, THOMAS C. (1590–1646), an early settler of New England, was born in England about 1590. He was a lawyer in London, and led a colony to Weston, Mass., in 1622, but soon returned to England. In 1625 he came again and settled at Mt. Wollaston, now Braintree. On May-day, 1626, the place was renamed Merry Mount, a May-pole was erected, and festivities engaged in which were regarded by the Plymouth Pilgrims as licentious. In 1628 they cut down the pole, arrested Morton, and sent him back to England; but in 1629 he returned. Again in 1630 he was seized and transported, and his house torn down. In 1632 he published in England *The New English Canaan*, which, though a satire, gives a good description of the country. When he returned to Massachusetts, in 1643, he was arrested and imprisoned for his "scandalous book," but in 1644 was dismissed with a fine. He died at Agamonticus, Maine, about 1646. His book was reprinted in Force's *Tracts*, and his career is the subject of J. L. Motley's novels, *Morton's Hope* and *Merry Mount*.

MORTON, William Thomas Green (1819–1868), an American dentist, the discoverer of the use of ether as an anæsthetic, was born in Charlton, Mass., Aug. 9, 1819. He studied dentistry in Baltimore, but began practice in Boston in 1843. He made extensive research for means of allaying pain during dental operations, and, after experimenting on himself, first used ether successfully, Sept. 30, 1846, to remove a bicuspid tooth without pain. After further experiments, he applied ether, Oct. 16, 1846, in the Massachusetts General Hospital to a patient from whose jaw a vascular tumor was removed. As soon as the discovery of anæsthesia was announced, other claimants appeared, the most noted of whom were Dr. Charles T. Jackson and Horace Wells. Dr. Morton patented his discovery under the name "Letheon," offering its free use, however, to charitable institutions. The French Academy awarded the Montyon prize of 10,000 francs, to be equally divided between Dr. Jackson and Dr. Morton; but the latter declined this award as prejudicial to his right of discovery. In 1852 he accepted the Montyon gold medal. Meantime he had to contend with great difficulties, in which his business was broken up and his house seized for debt. From 1846 to 1854 he struggled to obtain from Congress remuneration for his discovery, which had been used from its announcement in all the government hospitals. Physicians of Boston, New York, and Philadelphia supported his claims and urged a plan for a national testimonial. In 1858 he began a suit against a marine-hospital surgeon for infringement of his patent, and this was decided in his favor by the U. S. District Court. In the last years of his life he was engaged in agriculture and cattle-raising at Wellesley, Mass. He died at New York, July 15, 1868. See *Trials of a Public Benefactor*, by Dr. N. P. Rice (1859).

MOSES. See Israel and Pentateuch.

MOTHE CADILLAC, Antoine de la, the founder of Detroit, was born in Gascony about 1660. He served in Acadia as captain in the French army, and was recalled to France in 1680 to give information in regard to the harbors and coast defences of Canada. In 1691 he was made lord of Bouagnat and Mount Desert, Me. In 1694 Count de Frontenac made him commander of Michilimacinac. On July 24, 1701, he began to build on the site of the present city of Detroit a fort which he named Pontchartrain. His settlement was opposed by Canadian officials through jealousy, and in 1704 he was arrested at Quebec on charges of maladministration, but was finally acquitted. He afterwards fought against the Miamis and the Natchez. In 1711 he was made governor of Louisiana, but when the government was transferred to a company, De la Mothe returned to France in 1717. His further career is unknown. In 1787 Massachusetts confirmed to his granddaughter so much of Mount Desert as had not already been granted to others.

MOTT, Lucretia (1793–1880), an American philanthropist, was born at Nantucket, Jan. 3, 1793. Her maiden name was Coffin, and she belonged to the Society of Friends. In 1804 her parents removed to Boston, and in 1809 to Philadelphia. Here she was married to James Mott, who entered into partnership with her father. In 1817 she took charge of a school, and two years later she was recognized as a preacher. She made many preaching tours in New England and the Middle States, advocating peace principles and opposing slavery. When the Society of Friends was divided in 1827, she adhered to the liberal side. She was prominent in organizing the American Anti-slavery Society in Philadelphia in 1833. She was a delegate to the World's Anti-slavery Convention in London in 1840, but was refused admission as being a woman. She attended the first women's rights convention, in 1848, at Seneca Falls, N. Y., over which her husband presided. She continued her peaceful agitation in behalf of the causes to which she had devoted her labors until her death, which occurred at her residence near Philadelphia, Nov. 11, 1880. See Anna D. Hallowell's biography of *James and Lucretia Mott* (1884).

MOULDING and CASTING. During the past ten years a large number of machines for moulding in sand have been introduced in leading European and American foundries.

See Vol. IX. p. 425 Am. ed. (p. 479 Edin. ed.).

Fig. 1 shows an end elevation, partly in section, of Aikin and Drummond's machine for moulding in sand. Fig. 2 is a plan view of the parts which operate the binder plate. The pattern is attached to the reciprocating plunger-head D^2, and, in connection with the open follower D, form the mould by compression of the sand in the flask I. The continuing rotation of the cams G^1 retracts first the pattern-head slightly and then the following head. The sand is supplied to the sand-box C by a reciprocating drawer, which is furnished from a hopper. The top of the flask I is closed by a binder plate carried on the binder bar B, the latter being supported upon friction wheels B^1, running on the ways A^1, attached to the main frame A.

Fig. 1.

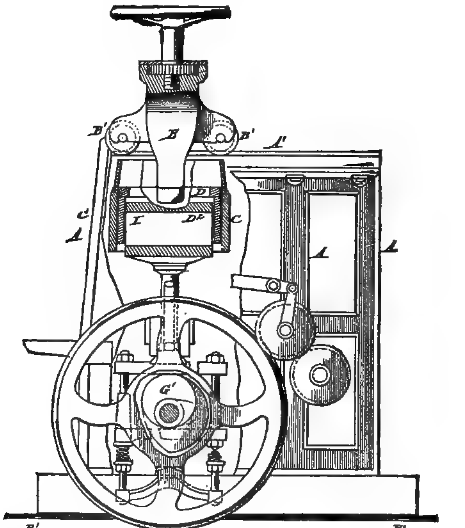
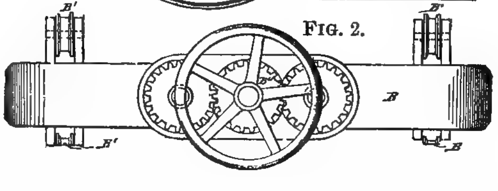


Fig. 2.



In making pipe-balls it has heretofore been customary to form a series or nest of matrices in the drag, each matrix being provided with points for centring and supporting the cores, which were formed independently of each other, and also required baking before they were placed in the matrices. This operation of forming and baking the cores consumes considerable time, as does also the final adjustment of these cores in the matrices; and a great many cores are broken during the numerous manipulations to which they are subjected from the time they are formed until they are placed in the mould. It has also been necessary to hold the cores in place by means of some superimposed weight, and for this purpose a roughly formed cope has been used.

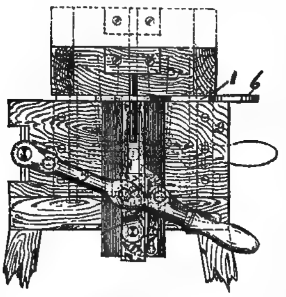


FIG. 3.

Fig. 3 shows an end elevation of Kinzer's machine for forming a nest of matrices in the drag, and a corresponding nest of cores in the cope portion of the mould. Fig. 4 is a sectional elevation showing the cope and core complete. The frame 2 of this machine is of a size approximating that of the flask in which the mould is to be formed. In forming the cope and cores a snap-flask is adjusted to the top plate, 1, and the cross-head is lowered until the short arm of the bell-crank lever rests upon the stops, 5, which should be so adjusted that when the short arm of the bell-crank lever rests upon them the upper ends of the core-lifters, 4, will be within the lower contracted portions of the core-boxes, as shown in Fig. 4. Sand is packed in the core-boxes, 5, venting core-rods being used, which consist of a nail-like bar having teeth on two of its sides, and longitudinal grooves on the other sides, and small wires having their lower free ends arranged in the grooves, and the upper ends of the wires united. The flask is filled with sand. The cores are then loosened in their moulds by blows of a hammer or mallet on the projection, 6, of the plate, 1, which projection is formed on the plate for that purpose. The handles of the levers, 7, are then raised, thereby raising the plate, 8, and the core-lifters and rods, 9. These core-lifters and rods act equally and simultaneously on the flask and the ends of the cores, thereby avoiding all liability of detaching or breaking the cores from the body of the mould. On the top plate, 1, are secured the runner-patterns in convenient proximity to several cores.

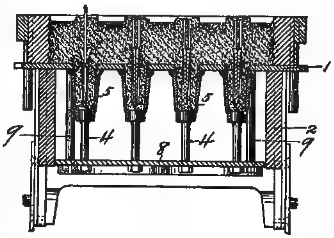


FIG. 4.

Various methods are in use for treating the face of sand moulds for making metal castings, one only of which need be described. In it a preparation consisting of resin, ½ ℔., plumbago, 1 ℔., and gasoline, 1 qt., is used. The mould is first prepared in the usual form. The resin and plumbago are then powdered and mixed and dusted evenly over the face of the mould, so as to form a thin coating. The gasoline is then poured on and lighted and allowed to burn as long as it will. This dries the face of the mould and also forms a crust, which prevents the iron in casting from adhering, but which is sufficiently porous to allow all gases to escape, and thus prevents bubbles from forming in the iron and also prevents it from "scabbing."

Metal Moulds.—When castings are to be made in moulds of metal the moulds should be so constructed as to allow the castings to be easily taken out of them, and provision should be made for heating or cooling the moulds, when required, so as to permit casting in the same mould to be repeated in quick succession. Mr. Wittenström's plan to effect this is to make the metal moulds with double walls and hollow hinge-bolts, so that steam or hot air may be admitted through the hollow hinge-bolts into the space between the walls to heat the mould preparatory to casting, and cold water afterward, while the casting is going on, to keep the mould cool.

Fig. 5 shows in elevation a mould embodying Wittenström's invention, the upper hinge being shown in section. Fig. 6 shows a longitudinal section.

These moulds consist of two halves, *S T*, of cast-iron or soft steel, united with the hinges u^1 u^1, and one or more locks, v^1. w^1 is the open space in which the metal is poured, and x^1 the gate. To form the double walls, each mould-half is cast with flanges round about, to which the plates y^1 y^1 are bolted. There are also transverse ribs, z^1 z^1, to make the water or steam circulate. These ribs serve also to strengthen the mould. The water is led to the mould and away from it through the hollow bolts a^2 of the hinge-joints u^1 which bolts communicate with the passages b^2 in the mould-halves and are provided with necessary flanges and stuffing-boxes. c^2 is the supply-pipe for the water, and d^2 for the steam. e^2 is the outlet. These pipes are provided with cocks, f^2 g^2 h^2, to turn off the water when the mould is to be heated by steam and to regulate the cooling. The lock is at v^1. The more delicate parts in the moulds are separately made and fixed to the mould, so as to be easily replaced. By means of lugs on the half of the mould without locks, the mould is attached either to a casting-wagon, as are the smaller moulds, or to some other suitable support during the casting process; but that half of the mould which carries the lock is kept free, so that the mould may be easily opened after casting.

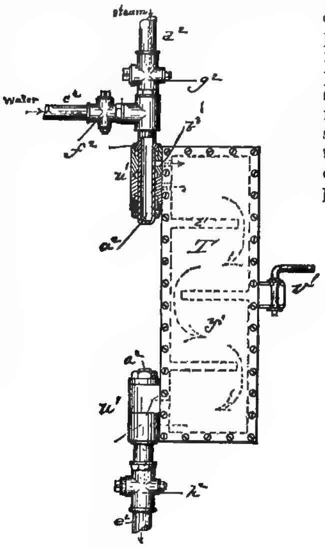


FIG. 5.

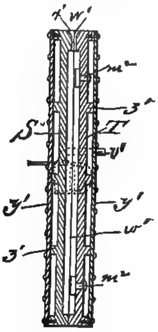


FIG. 6.

Ingot-Moulds.—In the manufacture of deck-beams and like articles from steel, efforts have been made to cast the ingots to approximate the shape of the article to be rolled from them—that is, of greater thickness at one or both sides or edges than in the central or web portion—so that the ingot may be rolled to the finished article by substantially an even reduction on both sides and the finished steel beam or like article be formed free from strain. In casting these shape-ingots difficulty has been encountered because of the peculiar shape of the ingot; the ingot having enlarged portions at the edges, being thinned or contracted between these enlarged portions, and the ingot-mould corresponding in shape to the ingot, and when the molten steel is poured the ingot-mould is, of course, expanded thereby. The parts of the mould forming the inner faces of the large cavities at each edge of the mould are expanded against the metal in the mould bearing against the inner faces of the enlargements of the ingot, thus preventing its normal contraction. Molten steel in setting and cooling contracts or draws toward the centre, and the form of the mould prevents the enlargements of the ingot from being drawn toward the thin central portion. As the steel of the ingot is in a soft and granular condition, it is weaker than the ingot-mould, and the ingot is liable to rupture in the web; consequently efforts to cast these shape-ingots have been unsuccessful.

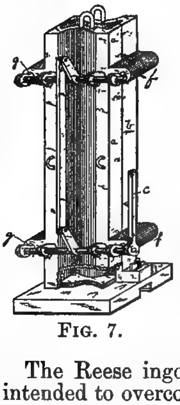


FIG. 7.

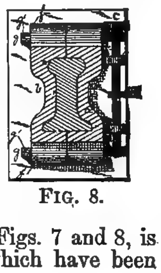


FIG. 8.

The Reese ingot-mould, shown in Figs. 7 and 8, is intended to overcome the difficulties which have been just mentioned.

Fig. 7 is a perspective view of a mould for the manufacture of ingots for I-beams. Fig. 8 is a cross-section of the mould for the manufacture of deck-beams.

Reese's invention consists, essentially, in an ingot-mould divided longitudinally into two or more parts, each provided with connecting-lugs, in combination with securing-bolts passing through the lugs, and cam-bars journaled in the bolts and carrying cams or eccentrics adapted to press against the mould, so that the two parts of the mould may be firmly clamped together. As soon as the molten steel is sufficiently set the mould is opened a sufficient distance by the cams to allow of the even contraction of the ingot. In casting the ingots in this mould the two parts *a* and *b* are secured together by means of bolts *g* passing through the lugs, the largest portions of the cams being turned against the sides or faces of the mould-half *a*, and the wedges *g* (Fig. 8) being driven tight along the outer faces of the lugs *f* on the mould-half *b*, so that the mould-halves are held firmly together by the pressure of the cams and wedges. The molten steel is then poured into the mould in the ordinary manner, and as soon as the steel is sufficiently set the operator, through hand-lever *c*, turns the cams, so as to allow for the usual contraction of the ingot in the mould, the hand-lever being turned several times if necessary to secure this end.

Apparatus for Pouring and Casting.—In the manufacture of iron and steel it is highly desirable to procure solid ingots and castings free from blow holes. In order to accomplish this object Caspersson suggests that the stream of metal falling into the mould be divided into a great number of small streams. For this purpose a vessel is used furnished with openings in the bottom and which we will term a "colander-funnel," into which the metal is gradually run, either from the furnace or crucible itself, or from a ladle, and from this colander-funnel the metal then runs down in fine streams into the mould, which is placed underneath. The finer the perforations in the colander-funnel the better will be the result obtained, provided always that the perforations are not so small that they become clogged up.

Fig. 9 shows the apparatus in vertical section placed over an ingot-mould. Fig. 10 shows the bottom of the funnel as seen from above. The funnel *A* is lined with any suitable refractory substance and discharges the metal into the ingot-mould *C* which is covered by the plate *D*, in which are two openings—the one at *E*, the other at *F*, for letting out the air and gases set free during pouring. By thus closing the mould it is claimed that the fine streams of metal are prevented from becoming oxidized. *B* is a part of the handle for manipulating the colander-funnel.

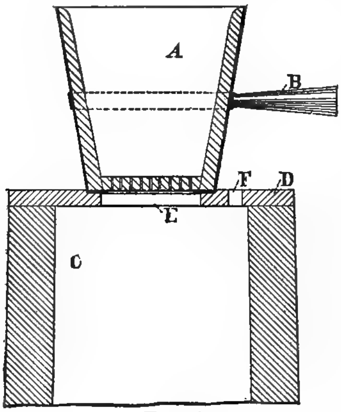


FIG. 9.

In casting great numbers of small castings from crucibles, when the iron is very soft or poor in carbon, the metal soon becomes thick, and finally solidifies if the crucibles contain more than 30 pounds to be poured out in from 10 to 20 moulds. It is the same if the metal is taken from a Siemens-Martin furnace and has to be kept some time in a common large ladle, as the casting cannot be made directly from the furnace. To obtain good results, especially in casting soft steel, the metal should be poured when at the right temperature, quickly and steadily, with an even, full jet, and the jet of metal should be protected from oxidation as it is poured.

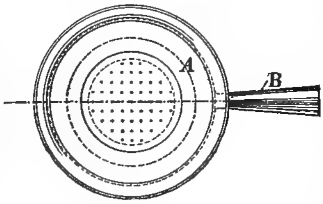


FIG. 10.

It has been proposed to maintain the proper temperature and fluidity of the metal during the pouring period by providing the ladle or its lid with a large gas-burner or other suitable heating device, whereby the temperature of the metal in the ladle may be maintained. This gas or other flame thus directed into the ladle also serves to protect the jet of molten metal from oxidation, as the flame issues out from the lip or mouth of the ladle and surrounds the jet of metal, so as to protect it from oxidation. In order to pour the metal in a steady, even, full jet the tipping-axis of the ladle is made to coincide with the edge of the lip, so that the tipping of the ladle does not change the position or direction of the jet. The moulds are preferably grouped on a turn-table or movable support, so that they may be quickly brought in succession under the jet, and the turn-table is mounted upon wheels, so that it also may be quickly removed. In place of mounting the plant of moulds upon a turn-table, the ladle itself may be swung in a crane, so as to be moved in succession over the moulds.

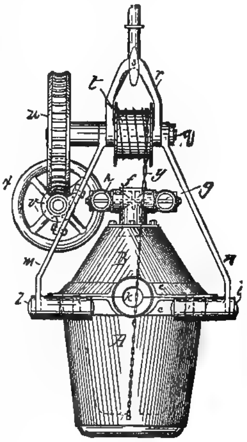


FIG. 11.

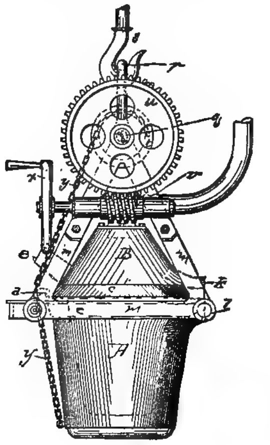


FIG. 12.

Figs. 11 and 12 illustrate the movable casting apparatus for this purpose, invented by Wittenström. *A* is the casting-ladle proper, covered with the lid *B*, both made of thin iron plates lined with fire-clay. Both the lid and the ladle have flanges *c c*, which unite as shown and form a hinge at *d* for guiding the lid when opened for filling the ladle with molten metal. The lid may be opened by means of a loose key threaded over the lugs *e* on the lid. In the upper part of the lid *f* is the gas-burner, to which gas and air (blast) are conducted through flexible tubes attached to the pipes *g* and *h*. The flame and products of combustion from the burner escape, after heating the ladle and the metal, through the mouth *k*, formed by lips bulged out half in the ladle and half in the lid.

The ladle *A*, which is hinged upon pivots located at *l l*, is supported by two triangular iron frames, *m n*, united at the back upon a level with the pivots by the connecting-piece *o*, on which the ladle rests with the lugs *p p*. The frame-work is held together at the top by a bolt or shaft *q*, passing also through a loop *r*, for the crane-hook *s*, and between the shanks of this loop a chain-wheel, *t*, is mounted. On the same shaft, *q*, outside the frame-work, is mounted a worm-wheel, *u*, in which the worm *v* gears. The axle of this worm is carried in bearings attached to one of the frames, *m*, and is provided with the hand-wheel *x*. By turning this hand-wheel *x*, the worm *v*, the worm-wheel *u*, and the chain-wheel *t* are put in rotation, and the chain *y* fixed at the bottom of the ladle *A*, and to the chain-wheel *t*, is rolled up on the latter, whereby the ladle is tipped with ease and precision.

The flexible tubes through which the gas and the air are conducted to the pipes, *g* and *h*, follow the movements of the crane-post and the gib, and to avoid ruptures the pipes *g h* are articulated at *z*. The flexible tubes are provided with common regulating cocks or valves; but these, as well as the way in which the tubes are carried along the crane, are not shown in the illustrations.

Compressing Fluid Metal.—According to Krupp's invention sound ingots and castings of steel and other metals—such as iron and copper—and alloys—such as bronze—are produced by pressure of gas on the molten metal in moulds, which are so constructed as to be capable of withstanding considerable internal pressure. After the steel or other metal has been poured into the mould the latter is tightly closed, and immediate communication is then made between the space above the molten metal in the interior of the mould and a reservoir which contains a substance in liquid or solid form—such as carbonic acid—which under ordinary pressure and temperature is in the gaseous state. According to the temperature to which the reservoir or the substance therein is exposed, and according to the properties of the substance employed, a gas-pressure of any required strength may be thus obtained. This pressure must be regulated within limits decided upon, as desired, and for this purpose Krupp places the reservoir in a bath of water, oil, or other suitable fluid, which, by the admission of steam or water thereto, can be heated or cooled as required. By the ordinary temperature of the atmosphere—say at 60° Fahr.—the pressure obtained by the liquefied carbonic acid is about 52 atmospheres, at 86° about 74 atmospheres, at 212° Fahr. the pressure rises to about 400 atmospheres, and at 400° Fahr. even to 800 atmospheres. The amount of these pressures depends upon and is influenced by the quantity of filling or contents of the vessel containing the fluid gas when such gas has a temperature higher than 86° Fahr., or, as it is termed, the "critical point." For the purpose of keeping the upper part of the molten metal hot as long as possible while the ingot is gradually and evenly cooling and contracting, the upper part of the mould has an interior lining of refractory material. An equivalent or additional means for the same end consists in pouring in a layer of molten slag on the surface of the molten metal immediately after it has been poured into the mould, and before closing the mould, and admitting the gas-pressure into same. An additional means of keeping this part of the metal in a molten state as long as possible consists in making use of a thick cover of a refractory material which is a bad conductor of heat. This cover is dropped on the top of the molten metal or slag. To insure success, the covering with slag or the use of the lining is necessary; but the use of both means together is preferred. The pressure is maintained on the metal in the mould until there is no further tendency to the formation of hollow spaces or pores in the ingot or casting.

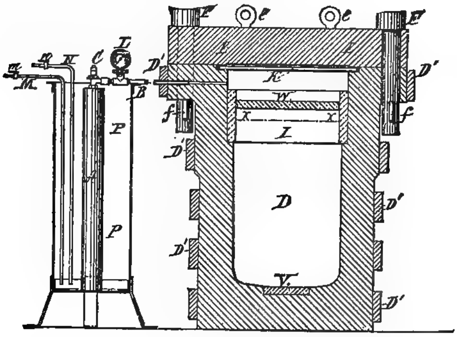


FIG. 13.

Fig. 13 shows an elevation in part section of a mould and gas-reservoir used by Krupp, the arrangements shown being designed to charge the mould with molten metal from above. The mode of casting with this apparatus is as follows: When the cover *E* has been removed by means of the eyebolts *e* or turned to one side, after all the bolts *F*, except one, have been removed, the molten metal is poured in. When it has reached to about the level *x x*, a layer of molten slag is poured in on the top of it. The lid *W* is then dropped on the top of the slag, the joint-ring *K* is placed into its recess, and the cover *E* quickly put on and fastened down securely and tightly. The cock *C* is then opened, admitting gas-pressure on the top of the slag and molten metal in the mould, and this gas-pressure is maintained until the ingot has cooled down to a dull-red heat, whereupon the valve *C* is closed and the cover *E* then removed, so that the ingot may be taken out. If the bottom of the mould were not protected by the disk *V*, the hot stream of metal impinging directly on it would melt this part and form a recess therein or crack it. The gas-pressure is indicated by the gauge *L*, and can, as stated, be conveniently regulated to any required extent by means of the steam-valve *m* and water-valve *n*.

Soaking Pits for Steel Ingots.—Hitherto, when a steel ingot has been cast, either by the Bessemer, the open hearth, or other process, it has in practice usually been taken, while yet hot, to a heating-furnace, and therein brought to a sufficient and even heat, preparatory to being rolled down into a bloom or into a finished article. This has been done at considerable expense in skilled labor, in fuel, in loss of yield, and in the building and maintaining of costly heating-furnaces. Attempts have been made to obviate this inconvenience and loss by rolling down ingots immediately after they have been stripped from the mould, and without the application of any heat other than their initial heat or that derived from the fluid metal of which they were formed. But in practice it was found impossible to carry this out, since every ingot could not be taken to the rolls at once, while, moreover, the heat of an ingot is unequally distributed—that is to say, an ingot, when stripped quickly, is in the interior too hot for rolling (sometimes it is even in a fluid or partially fluid state), and if kept long enough for the interior to be reduced to the proper heat the exterior becomes, from radiation, too cold for rolling. Sometimes, therefore, hoods or shields lined with refractory material have been placed over the ingots after they are stripped and before being conveyed to the rolls, to prevent unequal cooling, or to put them in portable chambers so lined, in which they are conveyed to the blooming-rolls. Again, the ingots have been packed for a while before rolling in pulverized charcoal, or an equivalent pulverized material, in portable boxes or chambers above ground or in pits, and commanded by cranes to lift them from the moulds to the chambers or pits, and from thence to the blooming-rolls. But experience has demonstrated these plans to be defective, chiefly because the exterior of the ingot becomes suddenly cooled or too greatly cooled to admit of proper development and uniform distribution of the heat throughout the ingot, and that these methods are also cumbersome and impracticable.

In 1883 Giers proposed to obviate these difficulties mentioned by constructing a series of stationary vertical soaking-pits or chambers—preferably under ground and near the blooming-rolls, and provided with thick walls of refractory material—these underground chambers being previously heated by the first charge of the ingots, and their temperature maintained by the successive charges. Suitable cranes are employed to carry the ingots quickly from the moulds to the pits, and from thence to the rolls. By these means the surface heat of the ingot is maintained or even increased from what it is when it leaves the mould, the interior heat reduced, its uniform distribution secured, and the whole process shortened and improved.

Giers' invention, in a convenient form, is illustrated in Figs. 14 and 15. Fig. 14 is an elevation and part vertical section, and Fig. 15 is a view in cross-section of the "soaking-pits." Referring to the illustrations, *a* is a Bessemer casting-pit, *b b* are cranes commanding the same, and *c c* are soaking-pits, shown arranged in a block of four rows, but which may be otherwise arranged—as, for example, concentrically to the crane. *d* is a blooming-mill, and *e* is a crane for transferring the heated ingots from the soaking-pits to the rolls. The soaking-pits *c* are constructed in a mass of refractory material, *f*—such as fire-brick—which will absorb a large amount of heat while in use. The cover *h* is lined also with refractory material, with which the pits *c* are covered after the ingots are deposited therein. Giers also prefers to use a second or false cover, slightly smaller in cross-section than the pit, consisting of a slab or block

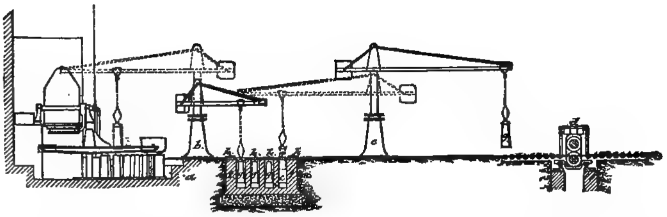


FIG. 14.

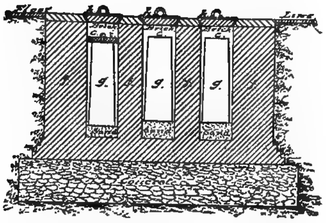


FIG. 15.

of fire-brick, which is placed on top of the ingot inside of the pit before the outside cover is put on, as shown at *i*, Fig. 15. This is especially desirable when the ingot is much shorter than the pit.

Each soaking-pit *c* is of a cross-section slightly larger than that of the ingot and of a depth slightly deeper than the length of the ingot. In practice it is found advantageous to make the pit of a cross-section exceeding that of the ingot by as little as is compatible with the ready insertion and withdrawal of the ingots; but in order to allow for those cases in which the ingots have fins or excrescences the pits are usually made about 3 inches larger in cross-section than the large end of the ingot to be treated.

The depth of the pit is made about 12 inches greater than the length of the longest ingot the pit is designed to receive, and the level of the pit's bottom is raised by putting in sand to form a floor to the pit, as shown in Fig. 15, so that when an ingot is under treatment in the pit its upper end may be only about 6 inches below the mouth of the pit. Into such a pit each ingot, after being stripped, is promptly placed and covered over at once with the lid. Before the operation of rolling is commenced the soaking-pits are heated by the first charge of ingots, which are inserted solely for that purpose. By the successive charges of the ingots the brickwork of the soaking-pit is heated and maintained to about a certain temperature, so that if by any delay an ingot is received short of heat its temperature is raised by the heat from the walls of the pit itself. The refractory mass of which the pits are formed acts as an accumulator and regulator of heat, giving and absorbing the same as is required to carry on in a practical, continuous manner the operation of preparing the ingots for rolling.

The period during which the ingot is to be left in the pit varies with the size of the ingot and respective temperatures of pit and ingot at the time of the insertion of the ingots in the pit. With ingots about 12 inches average thickness about 30 minutes are sufficient. After a sufficient time has been allowed to elapse the surface heat of the ingot is increased, assumes about the same temperature as the interior, and a proper and uniform temperature acquired, which fits the ingots for the operation of the blooming-rolls.

It has been found that the operation as just above described is perfectly successful if the works have been adapted from the beginning for such treatment and if charges of recently cast ingots pass through the soaking-pits with sufficient regularity and rapidity; but in works where the casting of the ingots takes place at some distance from the rolling-mill, or where the ingots produced are either of very small size or are cast at long intervals, it becomes somewhat difficult to preserve such a surplus of heat in the soaking-pit as is necessary for the attainment throughout the ingots of a sufficient temperature for rolling. To supply additional heat to the walls of the soaking-pits, and also to insure the retention by them of the temperature to which they have been raised, so that they may always be hot enough to receive a new charge of ingots, an arrangement of apparatus has been devised by Giers and also by Riley. Riley's invention consists in an improvement in the means of applying ignited gas to the soaking-pits at the times when the temperature would otherwise become too low. Instead of burning the gas or introducing the ignited gas into the pits themselves and in contact with the ingots Riley forms passages or flues in the walls of the soaking-pit and passes the ignited gas through these passages or flues, so as to maintain the walls of the pits at such temperature that heat will not be injuriously radiated from the ingots.

There is a small chamber into which the heating gas and air are admitted, the air being by preference forced in by blowing apparatus and through injecting apparatus arranged to draw in the gas. The gas and air are ignited in the chamber, and thence pass through a series of flues or passages formed in the walls of the soaking-pits to a flue leading to a chimney. The pipes or flues leading the gas and air to the chamber where they are ignited are passed through the ground or building near the soaking-pits, so as to take up heat which would otherwise pass off by conduction.

Fig. 16 represents a vertical section of an arrangement of soaking-pits, showing the application of Riley's invention. *A* is the surrounding wall of the soaking-pit chamber *B*.

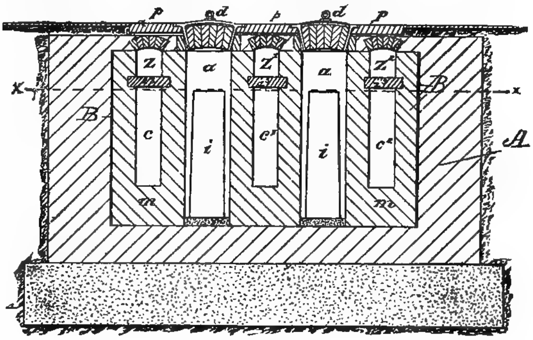


FIG. 16.

The heating of the brickwork *m* of the soaking-pit *a* is effected only from the outside by means of the gases passing through the flues $c\ c^1\ c^2$ in the direction of the arrows. Through the flues $Z\ Z^1\ Z^2$, above the gas-flues $c\ c^1\ c^2$, air is admitted and passes through in an opposite direction to the gases, whereby it becomes warmer, and when thus leaving the flues it is mixed with the gas and increases combustion.

The ingots in the soaking-pits are marked *i i*; *d d* are removable covers, and *p* is the covering-plate, of cast-iron.

The smaller rectangles z^3 below the letters $Z\ Z^1\ Z^2$ are walls or partitions separating the flues $c\ c^1\ c^2$ from the flues $Z\ Z^1\ Z^2$.

Casting Compound Ingots.—It is well known that a drill tempered to allow an operator to work through a plate of one degree of temper will be useless for the same purpose in another plate of another degree of temper, whether the same be harder or softer. With this fact in view safes have been formed of different plates of metal of different degrees of temper secured together; but the joints between the plates being readily found, it has been easy to change the drill to suit the quality of the metal.

Lustic, however, claims to produce a homogeneous mass of metal, differing from the metal of either of the plates united, by taking a plate of wrought metal and roughening one of its faces, so as to leave thereon numerous alternate projections and depressions. The face thus treated he then submits to a borax solution, or other flux, and places the plate in a proper mould. Upon this face of the plate there is then deposited a stratum of melted steel, more or less highly carbonized. This molten steel seeks the depressions in the roughened face of the first plate and fuses the projections thereon, so as to not only make a firm weld, but to produce at the touching surfaces a metal perfectly homogeneous, yet differing from that of either stratum. The ingot thus prepared is allowed to gradually cool in the mould, and when nearly cool the outer face of the steel may be similarly roughened, the ingot placed in a larger mould, and a stratum of more highly carbonized steel may be cast thereon in a similar manner. It is well known that in fused metal the currents of heat, seeking the nearest cool surfaces, cause a vibration of the atoms of metal, and hence a crystallized condition of the metal. The gradual cooling tends to retard this crystallizing process until the metal assumes a plastic state wherein crystallization is impossible. (C. T. D.)

MOULTRIE, John (1799–1874), an English poet, was born at London, Dec. 31, 1799. He was a grandnephew of Gen. William Moultrie. He was associated with W. M. Praed and others in editing the *College Magazine* and the *Etonian.* He graduated at Trinity College, Cambridge, in 1823, and took orders in 1825. He was rector of Rugby, and married a sister of James Fergusson (*q. v.*). His *Poems* (collected in 1854) are noted for tenderness of feeling and elegant construction. He died at Rugby, Dec. 26, 1874.

MOULTRIE, William (1731–1805), an American general, was born at Charleston, S. C., in 1731. He was the son of John Moultrie, a physician of Scotch birth, who had settled in Charleston. In 1761 he was a captain in an expedition against the Cherokees. In 1775 he was a member of the Provincial Congress, and was made colonel of a regiment June 17. He was a member of the council of safety, and in March, 1776, was ordered to take charge of the fort then being built on Sullivan's Island. It was in form a square with a bastion at each corner, and was built of palmetto logs laid in rows 16 feet apart, the intervals being filled with sand. It had 26 guns and a garrison of 435 men. On June 28, 1776, this fort was attacked by a British fleet of 8 vessels, with 262 guns, under Sir Peter Parker, assisted by a land force under Sir Henry Clinton. The attack lasted from noon about 8 hours, when the fleet withdrew with a loss of 205 men, the American loss being only 37. Moultrie was made a brigadier-general, Sept. 16, 1776, and commanded a body of North Carolina troops. In May, 1779, he opposed the advance of Gen. Prevost upon Charleston, and held the city until Gen. Lincoln arrived. On the capitulation of the city he became a prisoner, and in February, 1782, was exchanged for Gen. Burgoyne. He was made major-general, Oct. 15, 1782, and was governor of South Carolina, 1785–86 and 1794–96. He died at Charleston, Sept. 27, 1805. While a prisoner he wrote his *Memoirs* (2 vols., 1802).

MOUND BUILDERS. The pioneer settlers of the valleys of the Mississippi and the Ohio failed to discover indications of any human culture in these regions beyond that of the savage tribes with whom they contended for the possession of their new territory. Only when men with aptitude for scientific research made their way thither was it discovered that this whole region was thickly covered with the relics of a more ancient and more civilized race, who had apparently been completely supplanted by the modern Indians. The most apparent of these relics consisted of mounds of earth, varying greatly in shape, size, and apparent purpose. This fact, while of interest, was not in itself particularly striking. Earth mounds are found in all parts of the world, and seem to have been a general means adopted by savage and barbarous tribes for the burial and the commemoration of their leading men. But the mounds of the United States are by no means confined to purposes of burial like those of Asia and of other regions, but are of greatly varied design, and in many of their forms have no counterpart elsewhere upon the earth. While many of them are sepulchral, others are evidently defensive, others religious, and of many the design is, and perhaps will always remain, mysterious. They exist, moreover, in extraordinary abundance, being found throughout the whole region from the Rocky Mountain to the Alleghanies and from the great lakes to the Gulf, and to some small extent beyond these limits. The State of Ohio alone contains more than 10,000 mounds, besides 1000 or 1500 defensive works and enclosures. They are also very abundant in Illinois, Indiana, and Missouri. It is said that within a radius of 50 miles from the mouth of the Illinois River, in the State of Illinois, about 5000 of these ancient works exist. They existed so abundantly on the site of St. Louis as to gain for that city the name of the "Mound City." If we go South it is to find them in similar abundance. The Gulf States are full of them. From Florida to Texas they everywhere abound of the greatest diversity in shape and size. Nor are they restricted to the limits here given. Occasional small examples exist east of the Alleghanies. West of the Rocky Mountains, and throughout Mexico and Central America, they are found, though nowhere so abundantly as in the Mississippi Valley. These mounds are usually from 6 to 30 feet high and 40 to 100 in diameter, though some are much larger. To the vanished race to whose labor they are due has been given the name of the "Mound Builders."

It needed no very extended observation of these structures to discover that many of them had been erected for purposes of defence. In fact everywhere over the surface of the United States we perceive indications of a strenuous "struggle for existence" by a people who finally yielded to the persistent assaults of their foes. In many of the now deserted and desolate regions of the Rocky Mountains there are evidences of a considerable population, who built refuges from their enemies in the crevices of perpendicular cliffs. (See Cliff Dwellings.) These cliff dwellers have vanished, and only their often inaccessible habitations remain to attest their former existence. On the plains of the Mississippi Valley the earthwork replaces the cliff refuge, and alike tells the story of a long era of war and bloodshed, of persistent assault and persistent resistance, and of centuries of human history of which we have no record save in these earthen hieroglyphics, with their tale of rude culture, of war, of defeat, perhaps of annihilation.

Defensive Works.—In certain districts of the region whose limits are above given defensive works are numerous. They are generally earthworks, comprising ridges, enclosures, trenches, observatories, etc., all skilfully chosen as to site, and invariably in the neighborhood of water-courses. The indications are that the fixed centres of population and defence of this apparently numerous people were in the vicinity of the streams of the country, while it may be conjectured that the intermediate region was to a greater or less extent a debatable ground, a realm of war between the Mound Builders and the nomad hunting tribes, their persistent enemies. The fortifications are commonly built upon hills or river bluffs, usually of earth, though in some cases of stone. They are ordinarily enclosures of various shapes, which frequently embrace a considerable area, the walls sometimes low, sometimes from 12 to 20 or more feet in height, while small mounds at the entrances serve as protective defences to these weak points. Many of these works are skilfully connected with each other, and it is evident that they were not built for defence against temporary invasions, but were permanent fortifications, involving much time and great labor in their erection, and intended to protect a large and industrious population against an active and frequently aggressive foe.

The defensive works are most conspicuous in the region approaching the Alleghanies, and disappear when we enter the immediate valley of the Mississippi, where the largest mounds are found. This seems to imply that the stronghold of their enemies was in the east, possibly that they were a race of Highlanders, who made frequent incursions from their mountain fastnesses into the realm of their more peaceful and more civilized neighbors. Conant thinks that a great line of defence can be traced all the way from Western New York to Ohio, and even beyond. Squier and Davis advocate the same idea, and think that a connected line of defensive works extended from New York to the Wabash. Throughout this region are found the largest and most numerous defensive works, some of them so remarkable that a fuller description is advisable.

Of these works the most celebrated is that known as "Fort Ancient," on the apex of a hill near the Little Miami River, Ohio. In this, as in the defensive works generally, the situation has been chosen with great engineering skill. Hills are selected which nature has made partly inaccessible. On these the weaker places are defended with special care by high walls, trenches, and other expedients. Fort Ancient is erected on the summit of a very steep terrace, the fortification consisting of walls of tough clay from 5 to 20 feet high, according to the weakness or strength of the situation. Their average height is about 9 or 10 feet. These walls of earth are in all 4 or 5 miles long, and represent an estimated excavation of 628,800 cubic yards of earth. Yet the space which they enclose is but little over 100 acres. They wind round the brow of the hill, stretching out into its spurs, and re-entering to pass the heads of gullies, or in some cases descending to cross ravines. The hill is in two divisions, connected with an isthmus, and across this neck another wall is built to serve as a second defensive line to the southern stronghold in case the northern and weaker line was carried. In these walls there are over 70 openings or gates, 10 to 15 feet wide. It is not evident why so many were needed, and it is supposed that they were closed with timbers, or with heaps of stones during times of war. Large piles of water-worn stones are yet within the enclosure, which must, with immense labor, have been carried up from the river level. There are also 24 water reservoirs connected with springs within the enclosure. It is quite probable that these walls were palisaded and presented an almost impassable line to the assailing enemy. They are accompanied with ditches, frequently inside, occasionally outside, the walls of defence.

This description will serve to give a general idea of these fortifications. The fort embracing the largest area is said to be that near Bourneville, 12 miles west of Chillicothe. It is on the brow of a hill 400 feet high, with very steep sides. The wall in this case is built of stone, of an average height of 8 feet and an equal width of base. It is 2¼ miles long, and encloses about 140 acres. It is now in ruins. In connection with these defensive works are what are known as observatories. These are lofty mounds on the summit of high hills, supposed to be intended as lookout posts, to observe the approach and the movements of an enemy. They may also have served as signal stations, since by fires on their summits the news of an invasion could have been very rapidly flashed over a wide extent of country. One of these, on a high hill at Miamisburg, Ohio, is 68 feet high and 852 feet circumference at base.

It is probable that these specially strong fortifications were in the immediate vicinity of large settlements which occupied the river bottom lands below, and served as places of refuge for the whole population in case of special danger. In places where the bend of a stream forms a peninsula connected with the mainland by a narrow neck, defensive works are thrown across this neck. There are many instances of this kind, one, or sometimes several, lines of ditches and embankments being carried across the isthmus from stream to stream.

Sacred Enclosures.—While the hills were occupied for defence the valleys were occupied for habitation. The alluvial lands along the streams, forming levels of greater or less width, whose high fertility excellently adapted them to agriculture, were undoubtedly the seats of the settlements of this vanished people. While their habitations were too frail to leave any trace, their earthworks of various kinds yet abundantly occur in these localities, indicating a very numerous and very active population. On these lower lands are found another series of enclosures, with walls as high and thick as those of the hill defences, yet doubtless built for other purposes. They have been called sacred enclosures, though there is no evidence that they had any religious object, and their real meaning must remain problematical.

The irregularity in shape of the defensive works is replaced in these enclosures by a remarkable regularity. They are of several shapes, such as circles, squares, polygons, etc., these various figures being often combined into groups. The walls are usually not very high. Of works of this character the most elaborate and complete are those at Newark, Ohio. These comprise an octagon of 50 acres, a square of 20 acres, and two circles of 20 and 30 acres, respectively. These are accompanied with ditches and joined by connecting avenues, the whole space covered being more than 4 square miles. The walls of the larger circle are still 12 feet high by 50 feet thick at base, with an internal trench 7 feet deep and 35 feet wide. The total length of walls exceeds two miles. Though in all probability not military in their main object, defence must have been one of their purposes, and the large entrances are defended by slopes 35 feet high and trenches 13 feet deep, while the passages are labyrinthine in shape, so as to increase the difficulty of entrance. Many other such works exist in various localities. Within the enclosures are altars and mounds of diversified shapes. Accompanying some of them is a class of works called "graded ways," or avenues between parallel walls, which lead from one river-terrace to another. If these enclosures were devoted to religious purposes, or sacred festivals, the graded ways may have served as defensive avenues for priestly processions.

Temple Mounds.—In addition to the walls of earth and the observatory mounds is a very extensive series of other mounds, some of them of huge dimensions. The larger of these are known as temple mounds, and are supposed to have once served as the sites of temples in an elaborate religious system, vastly superior to the crude religious ideas of the modern Indians. These mounds are in some cases but a few feet high, though covering several acres. They are usually surrounded by an embankment. In some cases they are of extraordinary height and extent. The larger mounds are pyramidal in form, and round, square, or oval in shape. In some cases they are terraced, and they always have a level space at top. Many such huge mounds exist, both in the Northern and the Gulf States. The largest of them all is that at Cahokia, Ill. This huge earthwork forms one of a group of some 60 large mounds between Alton and East St. Louis. It is said to measure 700 by 500 feet at base, and 90 feet in perpendicular height. On the southwest side is a terrace, 160 by 300 feet, reached by a graded way. The summit is a level space of 200 by 450 feet. It was formerly surmounted by a small conical mound, about 10 feet high, from which human bones and various small articles were obtained. It is believed that a temple of the Mound Builders once occupied this summit.

Temple mounds are not very numerous in the defensive region. The only ones in Ohio are those at Marietta, Newark, Portsmouth, and Chillicothe. As we go south and west they become more numerous. Many large ones exist in the Gulf States. Of these the largest is that at Seltzertown, Miss. This huge structure is 600 by 400 feet at base, and 40 feet high, with a level platform at top of three acres in extent. The whole northern side—that most exposed to storms—is protected by a wall, two feet thick, formed of sun-dried bricks. The mound is surrounded by a ditch 10 feet deep. On its summit three other mounds rise, one of them 40 feet high, making the total height 80 feet.

There are many large mounds in Georgia and Alabama, one group on the Etowah River, Georgia, having seven large mounds, of which the largest is 65 feet high and 150 feet square on top, with a raised platform on the east side 20 feet high and 40 wide. Terraces and inclined planes aid access to its summit. Here was found a sandstone idol, with other articles, including some gold beads, the only ones ever found on the mounds. A wide and deep artificial canal leads from the river to these works. Many of these Southern mounds are of remarkable regularity of construction, showing great geometrical skill in their builders. One, nearly 70 feet high, at Florence, Ala., is as regular as if built by a modern engineer.

Altars.—Another series of mounds, of low elevation, and square, rectangular, circular, or elliptical shape, have been called altars, but their real purpose is problematical. They are of small dimensions, varying from a few inches square to as much as 50 by 15 feet. They consist of uniform layers of gravel, earth, and sand, distinctly stratified, and seldom more than 12 to 20 inches high. These layers cover a hearth or altar, always at the level of the ground, usually of burnt clay, though in rare instances of stone. All of these bear traces of severe heat, while in a few cases rough coffins of unhewn stone have been found around the altar. These altars yield calcined bones and many small articles, such as stone-carvings, mica ornaments, copper instruments, beads, disks, pottery, spear-heads, etc. It is remarkable that each seems to bear articles of the same general character. Thus, under one altar were discovered thousands of stone arrow-points of excellent workmanship. Another covered more than 600 stone-hatchets; another yielded about 200 stone pipes. A large one at Mound City, near Chillicothe, 10 by 8 feet at base, 6 by 4 at top, and 18 inches deep, yielded two well-preserved skeletons at a depth of about 3 feet. From others copper ornaments, sometimes thinly plated with silver; scroll-work, cut from thin plates of mica; fragments of pottery, bone needles, beads, and numerous other articles have been recovered. Though the purpose of these so-called altars may have been sacrificial, yet this is doubtful. It possibly indicates cremation. Its true nature, however, must as yet remain a mystery.

Burial Mounds.—The most numerous class of mounds is that whose purpose was undoubtedly sepulchral. Mounds of this character exist throughout the whole country of the Mound Builders in great numbers. They are of conical shape, of an average height of 15 to 25 feet, though said to vary from 6 to 80 feet in height. They are never found within the enclosures, but invariably outside. Many of them have been excavated, and they are usually found to contain the skulls and other bones of one or more skeletons, together with ornaments, utensils, weapons, pottery, etc. Many of these articles are of great interest, as to the contents of these and the altar mounds we owe our knowledge of the arts of the extinct race of Mound Builders. Some of the skeletons found in these mounds are those of modern Indians, buried by excavating their sides. The mound-builder skeletons are found deeper, and are often enveloped in bark, coarse matting, or cloth, and placed on thin slabs of wood. A vault of timber, or an enclosure of stone slabs, sometimes held the skeleton. With it were placed personal ornaments, bracelets, perforated copper plates, beads of bone, ivory, shell, or metal, and many other objects. Grave Creek mound, about 12 miles from Wheeling, W. Va., is the largest known of this class, being 70 feet high and nearly 1000 feet circumference at base. It was excavated in 1838, and proved to contain two sepulchral chambers, one at the base and one 30 feet higher. These were constructed of timber and covered with stones, which had sunk through the decay of the wood. The lower cyst contained two skeletons, the upper but one. With them were 3000 or 4000 shell-beads and other articles. Near Newark, Ohio, was formerly a stone mound 50 feet high and 182 feet diameter at base. In removing this, 10,000 to 15,000 wagon-loads of stone were moved. The "Big Mound" at St. Louis, about 35 feet high, displayed, at a depth of 25 feet, a trench or grave 4 feet deep, 18 wide, and 70 long. It was made of compact clay, and probably covered with beams to support the earth above.

Some authors say that the skeletons are always disposed at full length, with the arms carefully adjusted at the sides; but this is certainly not always the case. In an interesting communication made by Mr. John Ford before the Philadelphia Academy of Natural Sciences, he describes the opening of some mounds on the grounds of Mr. E. P. Ford, near Alton, Ill. The first opened of these revealed a stone vault, 12 by 4½ feet in dimensions, and deep enough for a man to sit upright. The sides were formed of stone slabs and the cover by other large slabs of stone. The contents were of high interest. After removing the earth with which the cyst was filled, there were revealed two skeletons, one at each end of the grave. These were in a sitting posture and facing eastward. The bones of perhaps twenty individuals were thrown indiscriminately between, every skull of which had been crushed in by a blow from a blunt weapon on the left side. It seemed evident that these were victims sacrificed at the grave of some great chief or chiefs. Another of these mounds contained four skeletons, sitting two by two within the cyst, all facing eastward. Each held a large sea-shell, grasping the small end of the shell in the right hand, while the large end rested in the hollow above the left hip. In each shell had been packed what appeared to be the bones of a child, yet in so decayed a condition that their true character was not quite certain.

In addition to mound burial, urn burial seems to have been practised to some extent, particularly in some of the Southern States. In Northern South Carolina have been found ranges of vases placed one over the other and filled with human remains. Cave burial was also practised. The mounds could only have been erected over the chiefs, rulers, or priests. The vast multitudes of the populace have left no traces of their sepulture.

Animal Mounds.—Still another and quite remarkable series of mounds occurs in several States of the North-west, but principally in Wisconsin, where they are abundant. It is possible that these were not the work of the Mound Builders, and they may have been formed by the ancestors of the modern Indians. This, however, must remain an unsettled question. The mounds referred to are in the forms of various animals, somewhat rudely represented, yet sufficiently distinct to give a general idea of the creature intended. They are of low elevation, varying from a few inches to two yards and more in height. In some cases they are formed in intaglio. Their extension is often considerable, ranging from less than 100 to over 400 feet in linear dimensions. They have been claimed as representative of the "totems" of the present Indian tribes, yet some of them certainly indicate non-totemic objects. Very many animals and birds seem imitated, though the definition of the species intended is seldom very positive. Among these are mentioned the buffalo, bear, wolf, otter, lizard, and turtle; among birds, the eagle, nighthawk, etc. The human form is also plainly indicated in some of these mounds. One of the most interesting of this class of mounds is the "snake mound," found upon a hill near Brush Creek, Ohio. This winds in an undulating manner along the summit of the hill for a distance of 700 feet, ending in a triple coil at the tail. It appears to be engaged in swallowing an egg, which is represented by an oval mound 160 feet in its longer axis. In the same State is an alligator mound, 250 feet long and 40 wide, though it is not sure that the alligator is intended. Perhaps the most interesting of these figures is the elephant mound, found in Grant co., Wis. This figure is 135 feet long, 60 feet from the feet to the back, and has an undeniable proboscis, 31 feet from its tip to the throat of the animal. In connection with this, it may be noted that a stone pipe has been elsewhere found which bears the same significant resemblance to the elephant. These discoveries raise some interesting questions. It is not easy to doubt that the elephant was intended, yet when and where did the makers of these mounds see this animal? The mastodon of America was very probably contemporaneous with man, yet it undoubtedly disappeared very many centuries ago, and it needs some hardihood to carry back the beginning of the mound-building era to this remote age.

Canals and Garden Beds.—There are some other works to which brief allusion may be made. Among these are canals, whose existing traces indicate considerable width and depth, which run back from the Mississippi to some of the adjoining lakes of Missouri. They may have been intended for irrigation, and possibly for navigation. What are known as the "garden beds" are found especially in Michigan, Wisconsin, and Northern Indiana. From their northerly situation they have, like the animal mounds, been considered the work of a separate people from the Mound Builders, whose distinctive works are not found to any extent in this region. These beds consist of parallel ridges or embankments, which often cover a considerable area. Similar formations exist in the region west of the Mississippi, from Iowa to Texas. They vary from 10 to 60 feet in width, and are 2 to 3 feet high. In Louisiana they occur still higher and wider. There seems no doubt that they are the work of man, though their purpose remains doubtful. There is an inclination to consider them as connected with agriculture, possibly by their elevation to produce drier beds than the humid alluvial soil. This may be a true explanation, for there can be no question that agriculture was generally practised by the Mound Builders, and was their chief dependence for subsistence.

Mound-Builder Art.—The contents of the mounds are quite as interesting as the mounds themselves, perhaps more so, from the knowledge they render of the arts and ideas of their builders. Several varieties of objects have been recovered from the mounds. Among these the articles of pottery are of great interest. They exist in considerable abundance, consisting of kettles, water-jugs, cups, vases, urns, and many other forms. This pottery was made of a darkish- or bluish-gray clay, mixed with sand, fragments of shells, etc., to give it coherence. The finer pieces were mixed with gypsum, which gave them a lighter color. The surface was shaped by the hand, and the vase hardened in a fierce fire. The ovens or kilns which have been discovered, and are supposed to have been used for the baking of pottery, are possibly of modern erection. Gourds and baskets coated with clay were used as moulds, and several other processes were probably employed, the art varying at different dates and localities. There is no indication that the potter's wheel was known, though some of the specimens found display excellent finish and symmetry. The art of glazing was not known. Some of the vases were painted and others ornamented with various designs, the ornamental lines and figures usually simple, but occasionally quite graceful. Among the forms represented in vases may be named the human face and figure, fruits, various animals and birds, and even fishes, of which the scales are clearly indicated.

Pipes have been found in great numbers, some of earthen-ware, others carved from slate, soapstone, and marble, but more frequently from a hard red or brown porphyry. Many of these represent animals, such as the beaver, the otter, the deer, the turtle, etc. Birds seem yet more numerous, among them the grouse, duck, swallow, owl, heron, and eagle. Human faces are also represented, occasionally with marked correctness and character. The modelling of these pipes often displays considerable artistic skill, and the ability to work and bore these very hard stones, with no metal harder than copper, so far as we are aware, is a mystery which is yet unsolved. Vases and jars of stone, and human masks of the same material, are among the objects found. In some altar mounds in Ohio, Metz and Putnam found in 1882 specimens of copper, silver, and a little native gold, all hammered into various shapes, and a considerable quantity of meteoric iron. Among other objects was about half a bushel of pearls. Copper seems to have been the only metal possessed in any abundance and in common use. This copper was mined on the shores of Lake Superior, though traces of mining operations have been found elsewhere. The ancient mines have been reopened, and in one of them, at a depth of 18 feet, was found a block of metal 2 feet long, 3 wide, and 2 thick. This had been placed on rollers and moved about 5 feet, when the effort to move it was abandoned. They seem to have lighted great fires in these mines, and then broken off the softened ore by blows with heavy stone hammers. Copper mallets were also used, of which one has been found of more than 20 pounds weight.

Of other articles may be mentioned knives of obsidian, or volcanic glass, a substance commonly employed in Mexico. Stone implements were used in great variety as weapons, manufacturing and agricultural tools, etc. These resemble the tools used everywhere in the stone age. Some of them are carefully polished. In addition were implements of shell, bone, horn, etc. Beads have been found by thousands. They are of mother-of-pearl, copper, shell, stone, and wood, sometimes thinly covered with metal. Other ornaments were pearls, cylinders of bone, the pierced teeth of various animals, etc. Mica seems to have been highly regarded. Numerous specimens of it have been found, the pieces in some cases more than a foot in diameter. It was apparently obtained from mines in the mountains of North Carolina. It was often cut into ornamental shapes, and pierced with holes, as if to hang up as a mirror. Sea-shells are found, some of which must have been brought from a great distance. Specimens of coarsely-woven cloth have been found, and axes and other weapons of copper, all apparently shaped by hammering cold. There is no satisfactory evidence that the art of smelting was understood. In a mound in Illinois, in 1876, were discovered several turtles in beaten copper, more than two inches long, the copper forming them being beaten to one sixty-fourth of an inch in thickness. These were evidently considered valuable jewels, and were wrapped in several coverings of various substances.

The stone implements were made of hone-stone, jasper, chalcedony, and other hard stones, and embrace spear- and arrow-heads, lance-heads adapted to warlike, fishing, and hunting purposes, axes with or without grooves for handles, hammer stones, pestles and mortars, etc. The chisels were often beautifully polished, and probably used to dress animal skins, peel bark from trees, etc. The largest implements of chert or quartzite are hoes and spades, flat on one side and slightly oval on the other. Some of these are finely finished, and their size and shape indicate that they were used in agriculture. There are numerous stone disks pierced in the centre, and probably used as ornaments. A considerable variety of ornaments seem to have been worn, of which very many examples exist. The clothing of the Mound Builders was probably in large part of dressed skins, though woven fabrics were worn, the cloth made of a coarse but uniform thread. Its material appears allied to flax. In conclusion of this part of our subject, we note that few traces of obscenity are found in the relics of mound-builder art. This is especially worthy of notice when we consider the extent to which obscene art seems to have prevailed in other parts of the world.

The Modern Indians.—The question now arises, Who were the Mound Builders? What vestiges of their history, if any, yet exist? These are questions which archæologists are not prepared to answer definitely, though they seem approaching a settled conclusion. Much study has been given to the skulls taken from the mounds in quest of rare characteristics. They vary considerably, but there is nothing to indicate an essential difference in race from modern Indians. And the arts of the Mound Builders have not quite died out in the existing Indian tribes. The latter, when discovered, were to some extent agricultural, protected their villages by stockades and other defensive works, and were expert in the manufacture of stone implements and in some other industrial pursuits. But all this is insignificant as compared with the varied industries and the magnitude of the works of the Mound Builders. These attest a population very much greater than that of the hunting tribes, and therefore necessarily in the main agricultural, and one possessed of a compact governmental organization and a developed religious system. Either the power of a despot over a large body of obedient people, or the influence of a strong religious sentiment, or perhaps both, were needed to erect the great earthworks so widely disseminated, and which were not built without enormous labor, with the simple means at their command. An Indian of the north, with his independent spirit and his crude religious ideas, would laugh to scorn the chief or medicine man who bade him perform such labors. But when we go south, a different state of organization and different religious ideas appear, and we seem to be treading closely on the footsteps of the vanished Mound Builders. When the Spanish explorers landed in Florida and made their way to the Mississippi, they found tribes existing in a very different condition from that of the tribes of the north. These tribes inhabited well-built and protected villages, and were skilful agriculturists and possessed of many manufacturing arts, while they still used the mounds in their vicinity as a base of the chief's dwelling, and perhaps for other uses. Nor had they quite lost the art of mound building, though it is questionable if the great mounds of the region were the work of their direct ancestors. Their organization was far in advance of that of the Northern Indians. In the Creek confederacy the chief, or *Mico*, possessed a certain degree of despotic power. He held his post for life; was a religious as well as civil dignitary, and was treated with the greatest homage and respect. Other important officers were the Great War Chief and the High Priest, while the Conjurer or Medicine Man answered to the sole religious dignitary of the Northern tribes. The vague superstitions of the latter were replaced here by a developed sun worship, which was conducted with much ceremony, there being temples in which a sacred fire was kept up with the greatest assiduity during the year, and relighted once every year with special ceremony.

The Natchez.—When the Spanish explorers reached the region of the Mississippi they found there tribes who we have considerable reason to believe were the direct descendants of the Mound Builders, and retained their arts and organization. These were the Natchez and other related tribes. They are now extinct, having been annihilated by the hostility of the French of Louisiana, but what we are told of them is of very great interest. Their language, so far as known, had no affinity with those of the other tribes. Their organization was a more complex and despotic one than that of the Creeks. Their chief was known as the *Sun*, and his power was completely despotic. He had religious as well as civil authority, and was looked upon as a sacred and direct descendant of the sun-god. His family were called *Suns*, and had special privileges. Beneath them was a nobility, while the common people were very submissive. The chiefs' dwellings were on mounds, and the mounds were also the seat of temples, in which the sacred fire was guarded with superstitious care by the priesthood. When these tribes were visited by La Salle in 1681–82 they are described as living in large, square, adobe dwellings, with dome-shaped roofs of canes, regularly grouped around a central area. The temple of the sun was adorned with the figures of three eagles, with heads turned to the east. Among the Natchez there was an elaborate cultus, with temples, idols, priests, keepers of sacred things, religious festivals, and the like, and a vigorous control over the people through their superstitions. In one town the Spanish explorers found a large mausoleum, 100 paces by 40 in extent, which held in large chests the bodies of defunct chiefs. At its entrance were gigantic wooden statues, skilfully carved and armed with weapons, while their attitudes were threatening and their looks ferocious. Inside were other statues, and in addition to the chests mentioned were smaller ones containing the valuables of the tribe. These consisted of valuable furs, robes of dressed skins and of handsomely colored feathers, mats of the inner bark of trees and of a species of grass, together with a great store of pearls. Other buildings served as armories, and contained a large store of weapons. The natives lived in comfortable dwellings, and were well clothed in dressed and painted deer-skins, feather-work clothing, and woven materials. The woman chief of one town, when she met De Soto, was seated on cushions in a canoe which was covered with awnings.

The condition and customs of these tribes are so interesting in respect to their probable relation to the Mound Builders, that one cannot but regret that they did not retain their pristine organization until visited by more observant people than the early Spanish explorers. There are various interesting points in regard to their institutions and habits which may be mentioned in this connection. They nowhere formed large governmental communities, but each town or village was regarded as independent, under its own mico and council. The council met every day in the central square of the village to consider questions of public interest. Over this meeting the mico presided, and was treated with the utmost respect as a direct representative of the sun, though his power did not seem so absolute in the eastern as in the Mississippi region. He held his post for life, and though the office was elective it generally remained in the one family—descent being in the female line. Agriculture was the main vocation of these tribes, though hunting was actively engaged in. All the soil was held in common, the only private property being in habitations and in immediate garden plots. And one interesting feature of the industrial situation was that, while every farmer or hunter had the right to the produce of his own labor, every one was obliged to deposit a part of his food product in the public granary—a circular building of stone and earth erected in some shady place. This wise provision was intended as a reserve store in case of want, and for the use of the helpless. The contents of the granary were under the absolute disposal of the mico. Capital punishment was administered in the presence of the council, the criminal being executed by the blow of a club on the skull.

This organization of the Southern Indians, as we have said, reached its ultimate development in the Natchez and their related tribes. Here the *Sun* was at once king and high priest, and absolute in power, the people being highly submissive. The distinctions of rank were more conspicuous than elsewhere. The great chief every morning performed certain religious ceremonies at the door of his habitation. He acknowledged no superior but the sun, and the tradition was entertained that he and his family were the descendants of a man and woman who originally came down from the sun to the earth. The ruler was not succeeded by his son, but by the son of his nearest female relative, who was known as the *Woman Chief*, and who also possessed the power of life and death over the people. So great was the influence over them of their superstitions, that the extinguishment of the sacred fire in the temple was deemed the greatest calamity that could possibly befall them. Among the Creeks, and possibly among the Natchez, it was the custom to extinguish it at a fixed period every year, and relight it after an interval, this interval being a period of dread and lamentation by the people. The death of the *Sun* of the Natchez cost the life of his guards and of many of his subjects, sometimes more than 100 persons being sacrificed. Few of the principal personages died without human sacrifices, the victims being chosen from their relatives, friends, and servants. Captives taken in war were sacrificed to the sun, and their skulls displayed on the temples.

We have gone into this description of the manners and customs of the Southern Indians from the fact that many archæologists are now satisfied that they were the direct descendants of the Mound Builders. The governmental and religious system, and the arts of these tribes agree in many respects with the indications which the mounds reveal, particularly in the traces of human sacrifice performed by crushing the skull, and the superstition and despotism which alone can explain the immensity of the labors performed. Some of the mounds are so great that it would take a thousand men months to erect them with all the aid of the best modern implements. It must have cost their original builders years of the hardest labor, all this earth being carried by hand, probably in baskets, often for a considerable distance, and deposited upon the mounds.

Historical.—The history of the Mound Builders can only be conjectural. Possibly, had the early settlers of America been disposed to archæological inquiry, traces of this vanished people might have been found north as well as south. A. J. Conant, in his *Footprints of Vanished Races*, says that the Indian tribes, when first known, had traditions of a superior race whom they had conquered and enslaved. Here and there a solitary individual was found who claimed to be a prophet and the descendant of a long priestly line, a representative of this superior race. To these statements no attention was paid, and only a few of the many traditions which might have been collected are now extant. It is not improbable that the semi-civilization of the Mound Builders originated in the Mississippi Valley, possibly in the highly fertile region of the lower Mississippi, and that it gradually extended northward, by a natural process of expansion, to the point of confluence of the Mississippi and Ohio. From this point the colonies seem to have followed several channels, keeping to the rivers, and extending through the valleys of the Ohio. the Missouri, and other streams, until they finally occupied the whole region already indicated. There is reason to believe that the mouth of the Ohio was the central region of their domain, from its lack of defensive works, its abundance of mounds, and the superior character of its objects of art and industry. Eastward and westward, they extended far towards the bordering mountain chains, and northward to Isle Royale and the shores of Lake Superior, where the traces of mining operations are their most northerly indications. It is conjectured that they came here only in the summer, on mining expeditions, and that they had no regular settlements in this region. The Mississippi and the Ohio seem to have been their main arteries of expansion, and the Missouri somewhat less so, while indications of their occupancy diminish as we pass further from this centre towards the north, east, and west.

It is possible that the reverse movement was in somewhat the same lines. If, in their advance, they pushed back the original inhabitants of the country, these seem to have held their own in the mountains, and to have finally retaliated. The many works of defence which exist indicate a fierce and long-continued era of warfare, in which it is probable that the soil of the United States was deeply drenched with human blood, perhaps at the same period that similar fierce conflicts between barbarism and civilization were taking place in Europe and Asia. As the Romans long drove back the German tribes and possessed their country, and yet were in turn overcome by these vigorous tribes, so may the Mound Builders have outspread and finally been overthrown. Probably they were conquered piecemeal, as there is no probability that they composed a single empire, but rather a congeries of independent tribes, with similar arts and organization. However that be, they vanished from the land which they had long inhabited, and it was left in full possession of the hunting tribes, who were found there as sole inhabitants at the advent of the whites, with only the deserted mounds and their contents in attestation of an earlier and more interesting people. The Mound Builders, driven from the North, and down the Mississippi Valley to their original seat in the Gulf States, may have there retained their manners and customs and partial civilization, with more or less completeness, till the coming of the whites, and have constituted the tribes found there by La Salle and his followers. Once more they were invaded by a powerful foe, before whose assault the last vestige of their ancient organization was to disappear, and their most illustrative tribe, the Natchez, to finally vanish from the earth.

As to the period in which the kingdom of the Mound Builders flourished in the North, many conjectures have been made. There are some indications which point to a considerable antiquity. Forest trees probably 600 years old are found on some of the mounds. Traces of decaying trees of yet older date exist. Yet after the abandonment of the mounds a long period must have elapsed ere forest trees could have taken root in their clayey soil, and a much longer period ere they could have been invaded by trees having all the variety of the neighboring forests, as was the case when they were discovered. There are also vegetable accumulations, which indicate a considerable lapse of time. In one ditch these accumulations were 3 feet 8 inches deep. The greatly decayed condition of the skeletons is another evidence of antiquity. Still another is the encroachment of streams upon the abandoned works. The works of the Mound Builders are not erected upon the present river terrace, but upon a higher one, which may indicate that the rivers have deepened their channels since the date of erection of the mounds, or perhaps that the purpose of this was to avoid inundation. If the era of abandonment of these works was thus remote, that of their erection may have been much more remote, and the slow growth of the civilization of the Mound Builders from original savagery may have occupied a vast period, whose duration it would be idle to conjecture. It will suffice to say, that in these strange remains we have a revelation of a remarkable and long-continued series of human events upon this portion of the American continent which, but for them, would be lost in utter oblivion.

It is not improbable that the Gulf territory of the United States may have been the centre of outflow of the civilization of another region than that of the Mound Builders. The migrations of the latter may have taken place south as well as north, and given rise to the civilization of Mexico. Or more probably this southward movement, before the overwhelming incursions of their northern foes, may have set in train a new movement southward, the southern tribes yielding as those of the north were pushed back on them, and migrating through the Mexican region to the seats of the Nahua and Maya empires. This conjecture is based not alone on the traditions of a northern origin which prevailed in these empires, but on the close conformity of their organization and their architecture to those we have been considering.

Sun worship was the early faith of the Aztecs. Their ruler was at once chief and high priest. His power was despotic. The perpetual fire of the temples was guarded as sedulously as in the north, and its extinguishment deemed a dire calamity. The land was held in common, and there were public granaries in which a part of all products had to be deposited. A governing council shared the authority of the ruler. Human sacrifice had grown to frightful dimensions. Other points of community might be named, but these are the most striking.

In architecture a similar community existed. The temples of Mexico were built upon terraced and truncated mounds quite similar in general design to those of the north. In Yucatan these terraced mounds are repeated, and here they bear enormous and profusely sculptured stone edifices. Here, then, we seem to reach the final outcome of that movement towards civilization which began in the north, and reached its culmination in the American tropics, in all its changes preserving the finger-marks of its origin. This is conjectural only, yet it is a conjecture based upon striking indications, and it is certainly by no means improbable that the civilization of North America originated in the valley of the lower Mississippi and its adjacent regions, extended northward, and left its relics in the works of the Mound Builders, and afterwards moved south before an irresistible force, finding its final seat in Mexico and Central America, where it may have displaced or mingled with a more archaic native civilization.

It has been recently reported that mounds, similar in general character to those of the United States, have been found in large numbers in the region of the Red River of the north, and these are now being investigated. If they prove of the same class, some revision of the extant ideas in relation to the limit of the mound-builder region will be necessary. (See ARCHÆOLOGY, AMERICAN, and AZTECS, in Vol. I.) (C. M.)

MOUNTAIN, JACOB (1750–1825), a Canadian bishop, was born at Thwaite Hall, Norfolk, England, in 1750. He was descended from Montaigne the essayist, and his grandfather, being a Huguenot, sought refuge in England in 1686. Jacob graduated at Caius College, Cambridge, in 1774, became a fellow in 1777, and afterwards held various ecclesiastical positions. In 1793 he was consecrated as first Protestant bishop of Quebec. After a laborious career he died at Quebec, June 16, 1825.

His second son, GEORGE JEHOSHAPHAT MOUNTAIN (1789–1863), a Canadian bishop, was born at Norwich, England, July 27, 1789. He graduated at Trinity College, Cambridge, in 1810, was ordained priest in 1813, and became rector of Fredericton, New Brunswick, and afterwards of Quebec. In 1821 he became archdeacon, and in 1836 bishop of Montreal, with charge of the Episcopal Church of Lower Canada. In 1844 he founded the Bishop's College, Lennoxville. In 1850 he was made bishop of Quebec. He died near Quebec, Jan. 6, 1863. He published *Songs of the Wilderness* (1846), composed during a journey to the Red River, and *Journal of a North-west Mission* (1853).

MOUNTFORD, WILLIAM, an American author, was born at Kidderminster, England, May 31, 1816. He was educated at Manchester New College, and became a Unitarian preacher at Manchester, and afterwards at Lynn Regis. Afterwards becoming a spiritualist, he removed to the United States in 1849, and took charge of a church at Gloucester, Mass. In 1856 he went to Europe, and on his return he settled in Boston. He published *Martyria, a Legend* (1845); *Euthanasy, or Happy Talks toward the End of Life* (1848; new ed., 1874); *Thorpe, a Quiet English Town* (1852); *Miracles, Past and Present* (1870).

MOUNT VERNON, a city of Ohio, seat of justice of Knox county, is handsomely situated at the crossing of two lines of railway, 45 miles N. N. E. of Columbus. It is substantially and finely built, and has 2 national banks, a private bank, 2 weekly newspapers, many handsome residences and business buildings, 9 churches, and a high school. The Vernon River affords water-power, which is employed in the manufacture of doors, window-sash, furniture, machinery, leather, and other goods. It was founded in 1805. Population in 1870, 4876; in 1880, 5249.

MOZIER, JOSEPH (1812–1870), an American sculptor, was born at Burlington, Vt., Aug. 22, 1812. He removed to New York in 1831, and was engaged in business until 1845, when he retired. Afterwards visiting Europe he studied art at Florence, and finally took up his residence at Rome. He died at Faids, Switzerland, Oct., 1870. Among his works are Pocahontas, Truth, Silence, Rebecca at the Well, The Prodigal Son, Jephthah's Daughter.

MUDGE, ENOCH (1776–1850), an American clergyman, was born at Lynn, Mass., June 21, 1776. He became a Methodist itinerant in 1793, and in 1796 went to labor in Maine, where he resided till 1816. During this time he was twice elected to the Massachusetts legislature, and assisted in passing the Religious Freedom Bill. He afterwards held various charges at Boston until 1832, when he took charge of the Seamen's Bethel at New Bedford. From this post infirmity compelled him to retire in 1844. He died at Lynn, Mass., April 2, 1850. A volume of his *Sermons for Mariners* was published.

His son, THOMAS HICKS MUDGE (1815–1862), was an able minister of the Methodist Episcopal Church. In 1857 he was made professor of sacred literature in McKendree College, Lebanon, Ill., and afterwards he had charges in Missouri and Kansas.

Another son, BENJAMIN FRANKLIN MUDGE, was born at Orrington, Me., Aug. 11, 1817. He graduated at Wesleyan University in 1840, and became a lawyer at Lynn, Mass., of which city he was mayor in 1852. He was State geologist of Kansas in 1864, and in 1865 professor of natural sciences in the Kansas Agricultural College. He has been prominent in educational and scientific work in Kansas.

MÜGGE, THEODOR (1806–1861), a German author, was born at Berlin, Nov. 8, 1806. He was engaged in mercantile business, but afterwards became a soldier. After studying in the University of Berlin, he published *Bilder aus dem Leben* (1829), and numerous tales, novels, and sketches of travel. After his death, Feb. 18, 1861, a complete edition of his works appeared in 33 vols. Among them are *Toussaint Louverture* (1840); *Die Schweiz* (1847); *Afraja* (1854), translated by Edward Joy Morris, and other tales of Norwegian life.

MUGWUMP. This word, in the orthography here given, is a political term added to the English language during the heated Presidential campaign of 1884 between S. Grover Cleveland and James G. Blaine. It was applied by the New York *Sun* to such members of the Republican party as refused to support their party nominee, Mr. Blaine, and advocated the election of Mr. Cleveland in the interest, as they claimed, of civil service reform. The word belongs to the Algonquin dialect of the Indian languages of North America, and is used by John Eliot in his translation of the Holy Bible (Cambridge, Mass., 1661), to translate the Hebrew word *alluph*, a leader. Eliot used it in the sense of "big chief," a term more comprehensible to the Indian mind than that which appears in the King James' version—"duke." The word was spelled "Mugquomp" in the singular, and "Mugquompaog" in the plural. It appears in many places throughout the Algonquin translation of the Old Testament, a notable case being 1 Chron. i. 51, 53; but the following example of its use is taken from Genesis xxxvi. 15, because it presents both forms of the word:

"Youg mugquompaog wunnaumonuh Esau, wunnaumoneh Eliphaz, montomegheunche Esau, Mugquomp Teman, Mugquomp Omar, Mugquomp Zepho, Mugquomp Kenaz." (Gen. xxxvi. 15.)

The English text is:

"These were dukes of the sons of Esau: the sons of Eliphaz the first-born son of Esau; Duke Teman, Duke Omar, Duke Zepho, Duke Kenaz." (J. C.)

MUHLENBERG, HENRY AUGUSTUS (1782–1844), an American clergyman and statesman, was born at Lancaster, Pa., May 13, 1782. He was for some years pastor of the Lutheran Church at Reading, Pa., and in 1829 was elected to Congress, where he remained until 1838, when he was made U. S. minister to Austria. He died at Reading, Aug. 11, 1844. His son, also HENRY AUGUSTUS MUHLENBERG (1823–1854), a man of brilliant talent, entered on a political career, and died just after taking his seat in Congress.

MUHLENBERG, Heinrich Melchior (1711–1787), the chief founder of the Lutheran Church in America, was born at Einbeck, Hanover, Sept. 2, 1711. His father, a member of the city council, died a few years later, and from his twelfth year Heinrich had to assist in maintaining the family. At the age of twenty-one he became tutor in a school, and in 1735 he was able to enter the University of Göttingen, whence he graduated in 1738. He then began to teach in Francke's Orphan House at Halle, and meantime prepared for missionary work in India. Hardly had he been ordained, however, in 1742, when there arrived a pressing call for Lutheran preachers in Pennsylvania, and thither he directed his course. He found numerous settlements with some faithful ministers, but the Lutheran population generally neglected. Besides his special labors at his places of residence, the Trappe and Philadelphia, he preached at every place where a Lutheran congregation could be gathered, and fulfilled the duties of bishop of them all. He founded, in 1748, the Lutheran Ministerium of Pennsylvania, the first in the United States. After residing in Philadelphia for fifteen years he was compelled, by the Revolutionary war in 1776, to withdraw to the country, where he continued watchful of the interests of his flock. He died Oct. 7, 1787. (See Lutherans.)

MUHLENBERG, John Peter Gabriel (1746–1807), was born at the Trappe, Pa., Oct. 1, 1746, being the eldest son of Rev. H. M. Muhlenberg. He was educated at Halle, Germany, but left the university to enlist in the dragoons. Returning to Pennsylvania in 1768 he was ordained and was pastor of a Lutheran church at Bedminster, N. J. In 1772 he settled at Woodstock, Va., and in consequence of the Virginia laws, he obtained Episcopal ordination from the bishop of London. He took an active part in public affairs, and in 1775 accepted a colonel's commission. After preaching a sermon in which he set forth the wrongs done to the colonies, he threw aside his gown and displayed his military uniform. Then reading his commission he went to the door and ordered the drum to beat for recruits. With 300 men he marched to the aid of Charleston, S. C. He was made a brigadier-general and served at Brandywine, Monmouth, and Yorktown. Before the army was disbanded he was promoted to be major-general. In 1785 he was vice-president of Pennsylvania, and served several terms in Congress, from 1789 to 1801, when he was elected to the U. S. Senate. In 1802 he was made a revenue officer, and in 1803 collector of the port of Philadelphia. He died at Philadelphia, Oct. 1, 1807.

His brother, Frederick Augustus Muhlenberg (1750–1801), was born at the Trappe, Pa., June 2, 1750. He was educated at Halle and held Lutheran pastorates in Pennsylvania and New York city. He was a member of Congress in 1779–80 and again 1789–97, during which time he was twice speaker. He died at Lancaster, Pa., June 4, 1801.

Another brother, Gotthilf Heinrich Ernst Muhlenberg (1753–1815), was born at the Trappe, Pa., Nov. 17, 1753. He was educated at Halle, Germany, and after his return to Pennsylvania in 1770, became assistant to his father in Philadelphia. He left the city in 1776 and in 1779 succeeded his brother Frederick as pastor at New Hanover, Pa. He afterwards had charge of a congregation at Lancaster, Pa., where he died, May 23, 1815. He was an able scholar and theologian, but is best known as a botanist. He was the author of *Catalogus Plantarum Americæ Septentrionalis* (1815), and *Descriptio Uberior Graminum* (1817). He left in manuscript *Flora Lancastriensis* and some theological treatises.

MUHLENBERG, William Augustus (1796–1877), an American clergyman, was born at Philadelphia, Sept. 16, 1796, being a great-grandson of Rev. H. M. Muhlenberg. He graduated at the University of Pennsylvania in 1814 and was ordained in the Protestant Episcopal Church in 1817. He was then made assistant rector of Christ Church, Philadelphia, under Bishop White. In 1821 he became rector of a church at Lancaster, Pa., and in 1828 he founded a school at Flushing, L. I., which afterwards became St. Paul's College. His liberal views in regard to this institution were never fully realized. In 1846 he became rector of the free Church of the Holy Communion, New York, erected by his sister. In 1858 he became superintendent of St. Luke's Hospital, which he had been active in founding. The ladies of the Protestant sisterhood, which he had organized in 1845, had charge of this hospital. Afterwards he established an industrial Christian settlement at St. Johnland, L. I. He delighted in every measure to promote practical Christian union and philanthropy. He died April 8, 1877. He was a man of eminently saintly character. He published *Church Poetry* (1823); *Music of the Church* (1852); and *The People's Psalter* (1858). Many of his hymns are familiar, especially "I would not live alway." See *Life and Work of W. A. Muhlenberg* by A. Ayres (1880).

MUKHTAR-PASHA, Achmed, a Turkish general, was born at Broussa, Asia Minor, in September, 1837. He received a military education at Constantinople, and with the rank of lieutenant took part in the Crimean war. In 1860 he was on the staff of Omar Pasha in his campaign against Montenegro, and displayed great bravery at the Pass of Ustruck. Returning to Constantinople, he was made professor of fortification in the military school. In 1866, as tutor, he accompanied the Sultan's eldest son in a visit to the principal countries of Western Europe. He was next engaged in determining the boundaries of Montenegro, and succeeded in securing to Turkey some important strategetical points. Then promoted to be general he took part in the expedition in Yemen in 1870. On his return to Constantinople with the rank of pasha he held various important army commands. In 1875 had command of Herzegovina, where he was barely able to keep down the insurrection. He was sent to Erzeroum in 1877 as commander of the army corps and distinguished himself by his gallant defence of Kars against the Russians. He was, however, eventually driven back to Erzeroum. In 1878 he was made commander-in-chief of the artillery and afterwards governor of Crete, which island he reduced to peace. In 1879 he was sent to Albania to carry out the provisions of the Treaty of Berlin.

See Vol. XVII. p. 19 Am. ed. (p. 13 Edin. ed.).

MULE, a hybrid between the male ass and the female horse, an animal largely employed for draught purposes in Southern Europe, particularly in Spain and Portugal and Italy, where it is largely used as a saddle and carriage animal. It is used for the same purposes in the East and in tropical America. It is employed to a considerable extent in some parts of the United States, particularly in the South, but comparatively little in the Northern States. Thus of the 1,812,808 mules and asses on farms in the United States on June 1, 1880, there were 192,027 in Missouri, 173,498 in Tennessee, 123,078 in Illinois, 75,000 to 125,000 in each of the several Gulf States, while there were but 22,914 in Pennsylvania and 5072 in New York. The prices of 3-year-olds ranged between the extremes of $60 and $150, and generally from $100 to $120. The use of mules in the South is on the plantations, where their steady, plodding habit is better suited to the character of the work and to the habits of negro drivers than would be the more excitable horse. In the North the horse is the usual draught animal on farms, though the mule is used to a considerable extent in the cities for shifting railroad cars and for any work that requires a long, slow, steady pull. It is more hardy than the horse, lasts longer, is less liable to disease, less nervous, and better suited to the sluggish work for which it is ordinarily used. During the civil war large numbers of mules were used in the U. S. army as team animals, these coming mainly from the breeding grounds of the West.

During the last century New England was the principal breeding region of mules for the United States and the West Indies, though the breeding stock used was very inferior. In the early part of the present century Kentucky became noted as a breeding State, the blue-grass region turning out large numbers of these useful animals. Later, Ohio entered largely into the business, which has since spread to other States. The breeding of mules is an important matter, as the character of these animals depends very greatly upon the stock of their parents. All asses are by no means alike. In fact, there are several distinct varieties which differ markedly in character. The clumsy, sluggish Spanish ass is a quite different animal from the light-built Maltese stock from which the lightest and nimblest mules are reared. Of this variety, which approaches the Arabian in shape and size, the earliest example in the United States was one said to have been presented by Lafayette to Gen. Washington. Asses of good blood have sold for as much as $5000 as breeding animals. Much also depends upon the character of the mare. It has been the custom to use mares for this purpose which were good for little else, much to the depreciation of the mule stock produced. Mules therefore differ very greatly in size, shapeliness, speed, and other useful qualities in accordance with the characters of their parents. In some cases they are clean-limbed, active, and well suited for carriage purposes, though it is doubtful if any of them ever made a mile in three minutes as claimed. In other cases they are unsightly, sluggish, stupid, and only fit for slow draught.

In South America mules bred from stock imported from Spain are more used in mountain travel than horses. They go better with the average driver, are more certain to take care of themselves, are cleverer at ascending and descending very steep places than the horse, though in running down ordinary hills they are less sure-footed. The "Mexican" or "Spanish" mules used throughout Mexico are said to be superior to any known in the United States. They are not large, but are of great endurance and seem capable of standing any amount of abuse and starvation. They are vicious and hard to break, and are best suited for pack animals. The highest carrying power of a pack mule is said to be 450 lbs., and that for moderate distances only, though it has been frequently stated that they could carry 600 to 800 lbs. We have no mules in the United States to vie with the fine stock bred in Spain, where they are raised from the large Spanish jack with selected Spanish mares. These animals are of large size, fine performance, black color, strong, and well-limbed, some being 15 or 16 hands high. They are hardier than horses, sure footed, as thick-set as dray horses, and are very different animals from the small-framed and ill-broken American mule. (C. M.)

MULFORD, Elisha (1833–1885), an American clergyman and author, was born at Montrose, Pa., Nov. 19, 1833. He graduated at Yale College in 1855, and afterwards studied at Berlin. He was ordained a Presbyter of the Episcopal Church, but becoming extremely deaf, he gave up all parish work, and for years conducted a large farm near his native place. After the establishment of the Episcopalian Divinity School at Cambridge, Mass., he was called to a professorship in that institution, with which he remained connected till his death. As a theologian he was of "broad-church" tendencies, and sympathized with the views of F. D. Maurice. He published only two books, *The Nation, the Foundation of Political Life, and Civil Order* (1870), and *The Republic of God* (1880). They are remarkable for profundity of thought and precision of statement. Essentially they are parts of the same treatise. In the first are discussed the social, civil, and political aspects of human society, and their bearing upon moral questions; in the other, the same ideas and principles are applied to man's spiritual relations. Dr. Mulford had rich gifts in conversation, and his oral utterances had more freedom and spirit than his written words. He exercised a profound and salutary influence over the rather limited circle of literary men who knew and appreciated his remarkable gifts. He died Dec. 9, 1885.

MÜLLER, Charles Louis, a French painter, was born at Paris, Dec. 22, 1815. He studied art with Cogniet and Gros, and first exhibited in 1837. He has devoted himself to historical painting with great success. Among his works are *Le Martyre de Saint Barthélemy* (1838); *L'Appel des victimes de la Terreur* (1849), his most noted work; *Vive l'Empereur* (1855); *Lanjuinais à la tribune* (1875); "Give us Barabbas" (1878). J. J. Jarves says of him, "Müller paints history as Motley writes it, picturesquely, and with insight into its emotions."

MÜLLER, Friedrich Max, an English philologist, was born at Dessau, Germany, Dec. 6, 1823. He was the son of the poet, Wilhelm Müller (1794–1827), and was educated at the University of Leipsic, taking his degree in 1843. Following the advice of Prof. Brockhaus, he devoted himself to Sanskrit, and published in 1844 a translation of the *Hitopadesa.* He then went to Berlin to study under Bopp and Schelling, and to Paris, where Burnouf induced him to prepare an edition of the *Rig-Veda*, with the Sayana Commentary. In order to collate the manuscripts in possession of the East India Company and in the Bodleian Library, he went to England in 1846. On the recommendation of Baron Bunsen, the Prussian ambassador at London, and of Prof. Wilson, the East India Company assumed the expense of the publication of Müller's edition of the *Rig-Veda.* He then settled at Oxford and issued the first volume in 1849. The work was completed in six volumes, the last appearing in 1874. But Müller was a man of abundant work; he gave lectures on comparative philology in 1850, and after being made a member of Christ Church College, was elected Taylorian professor in 1854. He published essays on the modern dialects of India, and during the Crimean war he made excellent suggestions in regard to the opportunity these afforded for comparative study of languages. He also devised *Proposals for a Missionary Alphabet.* Now thoroughly naturalized in his English home he published a *History of Ancient Sanskrit Literature* (1859) and his very popular *Lectures on the Science of Language* (2 series, 1861–64). He had in 1854 been made a curator of the Bodleian Library, but when in 1860 he was a candidate for the chair of Sanskrit, theological prejudice was still strong enough to cause his rejection. He labored on, however, in his chosen field, publishing *Hand-books for the Study of Sanskrit* (1865–70), including grammar, dictionary, and the text of the *Hitopadesa*, with notes. Apart from these more technical works he issued many lighter essays, yet embodying important results of his studies. These he modestly called *Chips from a German Workshop;* of them four series have appeared (1868–75). In 1868 a new professorship of comparative philology was founded at Oxford, with Max Müller as its first incumbent. In 1872, on the opening of the new University of Strasburg, he was appointed professor of Sanskrit, but, though he delivered some lectures, he declined the appointment. He was in 1873 invited by Dean Stanley to lecture in Westminster Abbey on the *Religions of the World.* His study of comparative philology had led him directly to comparative mythology and thence to comparative religion. His views of religion incidentally shown in several of his works were distinctly set forth in his lectures *On the Science of Religion* (1873), and again in his Hibbert lectures *On the Origin and Growth of Religion, as illustrated by the Religions of India* (1878). Since 1875 Prof. Max Müller has been relieved of the duty of teaching and has given his time to original research and literary work. One important result is a series of translations of *The Sacred Books of the East.* These comprise Brahmanic, Buddhist, Pahlavi, Parsi, and Confucian works, besides the *Quran* (1879–1885).

MÜLLER, George, an English philanthropist, was born at Kroppenstädt, Prussia, Sept. 27, 1805. After some difficulties due to poverty, he was educated at the University of Halle. While journeying in Switzerland in 1825, he attended a private devotional meeting by which his religious views were changed. He began to preach in 1826, and two years later was invited by the London Society for Promoting Christianity among the Jews to labor in London. Though he went in March, 1829, he soon found himself unable to comply with the conditions imposed. He then became minister of Ebenezer Chapel at Teignmouth, and depended on voluntary contributions for his support. In 1834 he joined with others in establishing a society to supply Bibles to schools. In 1835 he issued a proposal to establish an orphan house, which was opened May 18, 1836, in a hired house. In 1837 he issued his *Narrative of the Lord's Dealings with George Müller*, in which he states his method of obtaining funds for his work and support. He refuses to make any appeal or hold meetings for the purpose, but by prayer makes known his wants to God. By unsolicited donations of money and service he is able to carry on a work which has grown to such an extent in 1875 that 2000 children were lodged, fed, and educated. Five buildings have been erected for their accommodation, costing altogether £115,000. Home and foreign missionaries are also supported and Bibles and religious tracts distributed in large quantities. His *Narrative* has been continued at various times, giving full account of his work and expenditure. Mr. Müller has visited the United States several times, the last time in 1884. He is also pastor of a congregation which has been gathered by his labors.

MÜLLER, Julius (1801–1878), a German theologian, was born at Brieg, Silesia, April 10, 1801. He was a brother of Karl Otfried Müller (for whom see the ENCYCLOPÆDIA BRITANNICA). He studied jurisprudence at Breslau, and afterwards theology at Göttingen and Berlin. After service as village pastor, he was in 1831 made university preacher and lecturer on theology at Göttingen. In 1835 he was called to be professor of dogmatics and ethics at Marburg, and in 1839 at Halle. In 1850 he joined with Neander in founding *Deutsche Zeitschrift fur Christliche Wissenschaft*. His chief work is *Die Christliche Lehre vom Sunde* (1839–44), translated into English as *The Christian Doctrine of Sin*. Besides he contributed many articles to theological reviews, but by his will he ordered all his manuscript to be destroyed. He died at Halle, Sept. 27, 1878.

MUMPS. See FEVER.

MUNCH, Andreas, a Norwegian poet, was born at Christiania, Oct. 19, 1810. He was a son of the Bishop of Christiansand, and graduated at the University of Christiania in 1834. After publishing some poems and dramas he began to edit a paper in 1841. In 1850 he was appointed to a post in the University Library, and in 1860 received a pension from the Storthing. Among his poems *Sorg og Trost* (1852) is the most noted. He also published *Billeder fra Syd og Nord* (1848), giving an account of his travels in Italy. Among his dramas are *Salomon de Caus* (1854); *Lord William Russell* (1857).

MUNCH, Peter Andreas (1810–1863), a Norwegian historian, cousin of the preceding, was born at Christiania, Dec. 15, 1810. He graduated at the university of that city in 1834, and began to lecture on history in 1837. He was made professor in 1841, and royal historiographer in 1861. In the preparation of his chief work, *Det norske Folk's Historie* (9 vols., 1852–63), he visited England, Scotland, France, and Rome. The work, thus founded on original research, is eminently interesting, though in some instances the author has set aside the received version of events on insufficient evidence. He died at Rome, May 25, 1863. Besides his history he published several philological works.

MÜNCH, Friedrich (1799–1881), a German-American author, was born at Niedergemünden, Hesse, June 25, 1799. He studied theology at Giessen, and succeeded his father as pastor of the village church. In 1838, with Paul Follen, he established an emigration society at Giessen and removed to Missouri, where he became a farmer. He was elected to the Missouri senate in 1862 and served four years. He died at Dutzou, Mo., Dec. 14, 1881. Among his works, all in German, are *Ueber Religion und Christenthum* (1847); *Der Staat Missouri* (1859); *Amerikanische Weinbauschule* (1867); *Die sinnliche und die geistige Lebensansicht* (1871); *Geisteslehre für die heranreifende Jugend* (1872). He also published a life of Charles Follen (1872).

MUNCIE, a city of Indiana, county-seat of Delaware county, is on the West Fork of White River, 54 miles E. N. E. of Indianapolis. It is at the junction of several railway lines, and has a court-house, several daily and weekly newspapers, 2 national banks, and 6 churches. It is a handsome and well-built place, the principal town and trading-centre of a large tract of fertile country. It has thriving manufactures of furniture, castings, farm implements, and other goods. Population in 1870, 2992; in 1880, 5219.

MUNDT, Theodor (1808–1861), a German author, was born at Potsdam, Sept. 19, 1808. He studied at Berlin and Leipsic, and afterwards travelled in Europe. In 1839 he began to lecture at the University of Berlin, and in 1848 was made professor of history at Breslau, but he returned to Berlin in 1850 as librarian. Here he died, May 30, 1861. Among his works are *Madonna* (1834); *Thomas Münzer* (1841); *Carmola* (1844); *Mendoza* (1847). He also published various books of travels, histories of German literature, art, and society. He edited the works of Charlotte Stieglitz and Knebel.

His wife, **Klara Mundt** (1814–1873), was widely known by her pseudonym "Louise Muhlbach." She was born at New Brandenburg, Jan. 2, 1814, and was married in 1839. She published about fifty romances, chiefly historical, which obtained such popularity that she was able to support her husband during his long illness, and to live in fine style in Berlin. She was a liberal in politics, and an advocate of woman suffrage and various social reforms. She died at Berlin, Sept. 27, 1873. Her historical romances, beginning with *Frederick the Great and his Court*, professed to keep close to the facts, and had for a time great vogue in English as well as in German, but have passed entirely out of sight.

MUNICIPALITY. Municipal corporations, created by government for political purposes and having subordinate and local legislative powers, are more numerous and more frequently found in the United States than in almost any other civilized country. They are created only by legislative action, and never, as was formerly the case in England, by the will of the executive power. Counties, cities, towns, and villages are the ordinary forms of municipal corporation in this country. The U. S. government has never attempted to form municipal organizations within the States, but passes laws for the formation of territorial governments which are essentially municipal corporations, though differing from others in extent and powers.

See Vol. XVII. p. 33 Am. ed. (p. 27 Edin. ed.).

The organization of small towns into corporate bodies was begun in New England almost as soon as the colonies had established local assemblies. The formation of these corporations was a peculiar feature of colonial legislation before the Revolution, and M. De Tocqueville, in his *Democracy in America*, considers them as forming the basis of political liberty in America. Membership in these corporations is dependent only on residence. Every inhabitant thus becomes in large measure responsible for the conduct of local affairs, and the interest in public matters thus created is a principal source of developing freedom of thought and action.

Public corporations were formerly organized usually under special acts of the legislature, granting charters, specifying the powers and duties of the corporations, their officers, and the matters concerning which the local bodies might legislate. The tendency recently has been to cause municipal corporations, as well as private ones, to be organized under general laws. These specify certain powers which all municipal corporations shall possess, and give to towns and counties uniform systems of government, usually providing for trustees, boards, or commissioners to manage the affairs of towns, and providing for the election of clerks and sheriffs for the counties. The large cities usually have special charters. Public corporations are subject to legislative control, but matters relating to the strictly local affairs of the corporations are for the most part left with officers with whose direct appointment the legislature has little to do.

The charters of municipalities in the United States usually confer powers on the local authorities in relation to police and excise matters, the care of the poor, the establishment of public schools, the erection and care of wharves, the prevention of fires, the furnishing of free supplies of water, the regulation of the health of the inhabitants, the management of ferries, the care of streets, markets, street-railways, and parks, the licensing of amusements and certain occupations, and the passage of certain ordinances for the general welfare and safety of the inhabitants. As incidents to these powers, municipalities have the power of taxation and of issuing bonds, though the extent of the indebtedness is now frequently restricted by constitutional provisions in the various States. Municipal corporations have also the right, under legislative enactment, to take private property, at a just compensation, for public uses—such as the erection of public buildings, the formation of public parks and streets, and the building of aqueducts and sewers.

The method of governing municipal corporations varies in different States. The New England town-meetings form the foundation of a peculiar system. Annual meetings are held, at which every male citizen of 21 years of age and upwards (except paupers, etc.), who has resided in the State and town for a stated time, has a right to attend and vote. At these meetings are elected town officers, who in Massachusetts include selectmen, assessors, treasurer, constable, field drivers, fence viewers, surveyors of lumber, measurers of wood, etc. Moneys may be voted for the support of town schools, the relief and employment of the poor, the laying out and repair of highways, the procuring and writing of town histories, the establishment of places for burial, the destruction of noxious animals, and similar matters. No subject can be voted on except as announced in the published call for the meeting.

The distinction between this town system and that for the government of cities is that the whole people, in the former case, meet and act on matters which in the larger corporations are left for the action of representatives elected by the people at the municipal elections. The government of cities has been a much more difficult subject than that of towns for the legislatures of the States. The representatives chosen in many of the large cities have shown themselves often careless in the management of public finances, and anxious rather to please the majority of the electors in their individual districts than to consider the welfare of the city at large. Taxes have annually increased under the management of local affairs in some of the cities, and franchises have been granted with little regard to the rights of the municipality.

The most recent movement in regard to the affairs of cities has been towards giving greater power to the head of the municipal organization in the appointment of subordinate officials, and towards freeing the control of local affairs from the too frequent interference of legislative bodies. The evil which it is claimed may be corrected in this way is the division of responsibility among a number of persons who may each shield himself under the action of others. If the power is more largely concentrated in a single individual, it is thought that the people will find a ready means to remedy his shortcomings by censure at a subsequent election. On the other hand, the danger is increased of the misuse of power by a scheming politician who attains to the chief office in a municipality.

The subject of municipal corporations in the United States has been exhaustively dealt with in Judge John F. Dillon's *Commentaries on the Law of Municipal Corporations.* (J. P. D.)

MUNKACZY, Mihaly, a Hungarian painter, was born at Munkacs, Oct. 10, 1846. His parents were slain by the Russians in 1849, and he was apprenticed to a cabinetmaker. In 1863 he began to take lessons in painting at Pesth. Thence he passed to Vienna, Munich, and Düsseldorf, where his paintings attracted attention. In 1870 he exhibited at Paris a remarkable picture called The Last Day of a Condemned Criminal. It was founded on an old Hungarian custom of exposing such a prisoner to public view for several hours, and the merit of the picture is in presenting the different expressions of those who have come to view the unfortunate man. Among Munkaczy's other pictures are The Mont-de-Piété (1874); The Village Hero (1875); The Night Prowlers (1874); Story of the Hunt (1877); Milton Dictating Paradise Lost (1878). Munkaczy married in 1874 Baroness de Marches, and resides in Paris.

MUNRO, Hugh Andrew Johnstone (1819–1885), a British classical scholar, was born at Elgin, Scotland, Oct. 14, 1819. He graduated at Trinity College, Cambridge, in 1841, and became a fellow in 1843. In 1869 he was elected professor of Latin in the University of Cambridge, being the first occupant of that chair. He is best known by his editions of Lucretius, the first of which appeared in 1860, and an entirely new one in 1870. He published also an edition of Horace (1869), and *Criticisms and Elucidations of Catullus* (1878). He died at Rome, March 30, 1885.

MUNSELL, Joel, an American printer, was born at Northfield, Mass., April 14, 1808. He settled at Albany in 1827, and published the *Albany Minerva* in 1828. He afterwards published various papers, weekly and daily. He thoroughly studied the art of printing, practically and historically. A large part of his valuable collection of works relating to the history of printing was purchased for the New York State Library. He has edited and published *Annals of Albany* (10 vols., 1850–58), and several other works of local history: *Chronology of Paper and Paper-Making* (1857); *Every-Day Book of History and Chronology* (1858). He has published many antiquarian works for societies and individuals.

MURDOCH, James Edward, an American elocutionist, was born at Philadelphia, Jan. 25, 1811. He first appeared on the stage there in 1829, and after playing in Southern cities appeared at New York in 1838. He withdrew from the stage in 1842; gave a series of lectures on Shakespeare's characters. He also taught elocution, but in 1845 he returned to acting. He went to England in 1856 on a professional tour. During the American civil war he gave readings and recitations in aid of the U. S. Sanitary Commission, and also personally devoted himself to the care of the sick and wounded. In 1882 he gave a farewell series of recitations in the principal American cities. He published, in company with W. Russell, *Orthophony, or Culture of the Voice* (1845), and his *Autobiography* (1880).

MURDOCK, James (1776–1856), an American clergyman, was born at Westbrook, Conn., Feb. 16, 1776. He graduated at Yale College in 1797, studied theology, and was ordained pastor of a Congregational church at Princeton, Mass., in 1802. In 1815 he was made professor of ancient languages in the University of Vermont, and in 1819 was called to Andover Theological Seminary as professor of sacred rhetoric and ecclesiastical history. In 1829 he settled at New Haven and devoted himself to literary work. He died at Columbus, Miss., Aug. 10, 1856. He published translations of Mosheim's *Ecclesiastical History* (3 vols., 1832), and of Mosheim's *Commentaries on the Affairs of Christians before Constantine* (2 vols., 1851–52). He also translated the New Testament from the Syriac Peshito version (1852). He edited Milman's *Latin Christianity* (1841). Among his original works were *Nature of the Atonement* (1823), and *Sketches of Modern Philosophy* (1842). He was a frequent contributor to theological reviews.

MURRAY, Alexander (1755–1821), an American naval officer, was born at Chestertown, Md., in 1755. He was commissioned as a lieutenant in the Continental navy in 1776, but served with a Maryland regiment till the end of 1777. He then took command of a letter of marque, but was captured and carried to New York. When released he volunteered on board the Trumbull and was again captured. He fought altogether in 13 battles on land and sea. In 1798 he was made captain and cruised in the West Indies. In 1802 he commanded in the Mediterranean, and, in the first action of the war with Tripoli, repulsed 17 gunboats. He died at Philadelphia, Oct. 6, 1821, being then the senior officer of the navy.

MURRAY, John (1741–1815), the founder of Universalism in America, was born at Alton, England, Dec. 10, 1741. His parents removed to Cork, Ireland, in 1752. He was brought up in the Church of England and became a follower of John Wesley. In 1760 he returned to England, and, having embraced Universalism, was excommunicated. He removed to the United States in 1770, and preached the first sermon, inculcating Universalism, at Good Luck, N. J., Sept. 30, 1770. The centennial of this event was commemorated in 1870. Murray preached at various places in the Middle States, but before the Revolution had settled at Gloucester, Mass., and confined his labors to New England. He took part in organizing the first Universalist Convention at Oxford, Mass., in 1785, and for several years was a delegate to the General Convention. He became pastor of the Universalist Society at Boston in 1793, and so continued till 1809, when he retired from preaching. He died at Boston, Mass., Sept. 3, 1815. He published *Letters and Sketches of Sermons* (3 vols., 1812), and after his death his interesting *Autobiography* was edited by his wife (1816, new edition 1870).

MURRAY, Lindley (1745–1826), an English grammarian, was born at Swatara, near Lancaster, Pa., in 1745. His father, a merchant, removed to New York in 1753, and the son was there admitted to the bar in 1766. Being a member of the Society of Friends, he took no part in the Revolutionary war, but retired to Islip, L. I. In 1784 he sailed to England for his health, and thenceforth resided at Holdgate, near York. Here he published his famous *Grammar*, *Reader*, and other text-books, as well as *The Power of Religion on the Mind* (1787), and some other religious treatises. He died Feb. 16, 1826. After his death his *Autobiography*, with a continuation, appeared (1826). He left a fund for the publication of moral and religious literature, which is now held by the New York Yearly Meeting of Friends. His *Life* has been written by W. H. Egle (1885).

MURRAY, Nicholas (1802–1861), an American clergyman, was born at Ballynaslow, Ireland, Dec. 25, 1802. Coming to New York in 1818, he was employed in the printing-house of Harper & Brothers. Originally a Roman Catholic, he became a Protestant, and by the aid of friends was educated at Williams College, graduating in 1826. He then studied theology at Princeton, N. J., and in 1829 was ordained pastor of a Presbyterian church at Wilkes-Barre, Pa. In 1835 he became pastor at Elizabethtown, N. J. In 1849 he was moderator of the Presbyterian (O. S.) General Assembly. He was best known by his *Letters to Archbishop Hughes* (3 series, 1847–48), written under the signature of "Kirwan," in which he controverted wittily and skilfully the doctrines and practices of the Roman Catholic Church. Another series, addressed to Chief-Justice Taney, was published under the title *Romanism at Home* (1852). Dr. Murray died at Elizabethtown, N. J., Feb. 4, 1861. Among his works, besides those above mentioned, are *Notes, Historical and Biographical, concerning Elizabethtown* (1844); *Men and Things as I saw them in Europe* (1853); *Happy Home* (1859); *Preachers and Preaching* (1860). His *Memoirs* were published by S. I. Prime (1862).

His son, Thomas Chalmers Murray (1842–1879), became professor in Johns Hopkins University, Baltimore, and, after giving promise of rare excellence as an Orientalist, died March 20, 1879. His only publication was *Origin and Growth of the Psalms* (1880).

MUSCATINE, a city of Iowa, county-seat of Muscatine county, is finely situated on rocky bluffs at the apex of a great bend of the Mississippi River, 300 miles above St. Louis. It stands at the junction of the Burlington, Cedar Rapids, and Northern with the Chicago, Rock Island, and Pacific Railroad. It has numerous churches and hotels, excellent public-schools, a high-school, a public library, 3 national banks, 2 daily and 4 weekly newspapers. It carries on an extensive pork-packing business, and has manufactures of lumber, flour, furniture, agricultural implements, and other goods. It has a large trade by rail and river. It was founded in 1836 and received a city charter in 1853. The population in 1880 was 8295.

MUSEUM was the name given to the institution established at Alexandria by Ptolemy Philadelphus about 280 B. C. for the encouragement of learning. It had the most famous library of ancient times; and botanical and zoölogical gardens appear to have been attached to it. In the modern acceptation the museum is a collection of objects of art, science, and antiquity. The original museum under this acceptation is the Florentine, founded by Cosmo the Great at Florence. The next of importance was the collection made by Pope Leo X. in the Vatican. It was followed by the Museums of the Capitol and the Lateran, and by the private collections of rich Italian nobles, there being a furore in this direction during the sixteenth and seventeenth centuries. In all the capital cities of Europe large collections of curious, antique, and artistic objects were made, usually heaped together with utter lack of system. Not till the present century was a systematic arrangement adopted and order brought out of the confusion of these often extensive and invaluable collections.

Besides these museums in Italy already mentioned may be specially named the Museo Borbonico of Naples, principally made up of the antiques of Pompeii and Herculaneum and of the Græco-Italian cities of Southern Italy; and the Turin Museum, with its highly valuable papyri and other Egyptian antiquities. France possesses two very rich and valuable museums, those of the Louvre and of the Luxembourg. These are unsurpassed in the value of their works of art and antiquity. In Austria the Vienna Museum, and in Germany those of Berlin, Dresden, and Munich are the most important and are richly stored with priceless objects. The Museum of St. Petersburg, though of comparatively recent date, is one of the richest in existence. Numerous museums of less value exist in the other European cities, among which may be named the Museum of Greek Art at Athens, while at Boulak, a suburb of Cairo, Egypt, is one of recent institution which is exceptionally rich in Egyptian antiquities. The oldest museum in England is the Ashmolean, at Oxford, founded in 1679. But far the greatest of English collections is the British Museum, founded in

1753. In the extent, diversity, and total value of its treasures this museum is without an equal in the world. Its collections of antiquities, of scientific objects, and of works of literature are enormous in extent and priceless in value. Of the other English museums we need only name the South Kensington, with its highly important collection of mediæval art.

America is too young in date and too unfavorably situated in respect to the repositories of ancient art to be able to vie with Europe in the importance of its museums. The title of museum in America has been freely applied to collections of curiosities of the most heterogeneous sort, forming the stock in trade of some of our active showmen. Yet despite our disadvantages several collections of very considerable value have been made and the foundations laid of what may rank among the important museums of the future. The richest of these are those devoted to the collection of scientific objects. In this direction the United States can fairly challenge comparison with the richer European museums. This part of the subject, however, has been already treated under ACADEMIES OF SCIENCE and HERBARIUM. We shall confine ourselves, therefore, to American museums of art and antiquities.

The museum, rightly considered, may be divided into three distinct classes: the museum of record or preservation, that of research, and that of education. To the former belong all ancient and mediæval collections, beginning with the treasure-house of King Ahasuerus, one of the earliest known, coming to the temples of Ephesus, Delphi, and Athens, and the Ptolemaic palace at Alexandria, with their precious deposits, and descending to the royal and noble collections of the middle ages. These were stores of curious and precious objects only and were in no sense used to increase human knowledge or to educate the people. The museum of research, or collection of objects for study by learned men, and for the widening of human knowledge, is an institution of the past three or four centuries only. The museum of education, the true museum in the latest acceptation of the word, is one in which, while research may proceed, the collections are systematized and freely displayed to the public as an educational medium. This idea is of recent origin, and may be viewed as the direct outgrowth of the modern INDUSTRIAL EXHIBITION (*q. v.*). The World's Fair of London in 1851 became the starting-point of a considerable number of such institutions, very completely organized, of which the South Kensington Museum is the chief. The preceding museums made no attempt to effect the systematic exhibit of the products of nature and of human industry for the general improvement of the public taste, the fostering of the arts, and the advancement of knowledge, as is the ruling design in these recent museums. The world's fair, which seems to have had its day, is likely to be succeeded by the great permanent museum of the future. In the United States the Centennial Exposition of 1876 showed the educational importance of a great national museum, and gave rise as a direct outgrowth to the National Museum at Washington, which is destined to be the great museum of America. Several museums of limited scope had been previously established. In addition to those devoted to natural history there are several of considerable importance. The Peabody Museum of Cambridge, established by a bequest of $150,000 from George Peabody, and devoted to American ethnology and archæology, is already rich in objects illustrative of the habits and customs of the American aborigines, ancient and modern, and is rapidly adding to its collection. Its list in 1883 reached to the number of 33,150 distinct entries, with very many times more specimens, and it was adding to these at the rate of 4000 entries annually. Another important American museum of antiquities is the National Museum of Mexico. This has a rare collection of the arts of ancient Mexico and Yucatan. Among its treasures is the great monolithic calendar stone of the Aztecs. (See ARCHÆOLOGY, AMERICAN, Vol. I., p. 283.) It has also a massive stone of sacrifice and a huge statue of Huitzilopochtli, the God of War. This is destitute of human form and figure, and its surface is thickly covered with emblematic carvings. This museum has also a very valuable collection of paintings. There are several smaller museums of archæology in American cities, that of St. Louis being rich in relics from the neighboring mounds.

The Metropolitan Museum of New York is among the most important of American museums, its possession of the invaluable Cesnola collection of Cypriote antiquities giving it a unique interest (see CYPRIOTE ART). It is also in possession of a fine collection of modern art, Chinese and European, while its collection is rapidly growing. The most important art museum of Philadelphia is that of the School of Industrial Art, displayed in Memorial Hall, and, like it, a relic of the Centennial Exposition. Its value has very much increased since its inception in 1876, and it is now unsurpassed in the United States as a display of industrial art. In the city of Washington the Army Medical Museum is of exceptional importance, being considered the most complete of its kind in the world. It contains a vast collection of the hospital material of the U. S. army during the civil war, such as models and specimens of wounds, morbid conditions, surgical operations, etc., with models of hospitals, barracks, ambulances, surgical instruments, and numerous other objects. Its microscopic section is very complete.

The richest and most important museum of America is the National Museum at Washington, already mentioned. There had been in government possession, previous to 1876, a large collection of the results of expeditions and explorations, collected by agents of the government and of the Smithsonian Institution, together with valuable historical material. This was displayed to some extent in the buildings of the Smithsonian Institution and of the Patent Office. At the close of the Centennial Exposition the governmental exhibit there made was enlarged by the gift of the industrial exhibit of some thirty foreign governments. This great mass of material needed some means of proper display, and the present National Museum building at Washington was erected for this purpose under a Congressional appropriation. The building as now existing is ample in extent, excellently adapted to its purpose, and admirably lighted, and the vast collection of material, which is yearly receiving enormous additions, is being systematized and arranged with all possible rapidity. The collection is divided into five groups, respectively, anthropology, zoölogy, botany, geology, and exploration and experiment. These groups are separated into twenty-two scientific departments. The several halls or sections are devoted, respectively, to historical objects and costumes: ethnology, art and industry, mammals, fisheries exhibit, models of boats and other transporting agencies, sculpture and architecture, osteology, mineralogy, lithology and physical geography, metallurgy and economic geology, materia medica, foods and pigments, North American pottery, ornithology, prehistoric archæology, with several other divisions not yet arranged. The annual appropriations of the government, the work of exploring and surveying expeditions, and the labors of the Smithsonian agents are rapidly increasing this collection, and it must hereafter vie with the richest in the world as an illustrative display of scientific, artistic, and prehistoric material, and particularly of the conditions of life and nature in America. (C. M.)

See Vol XVII. p. 84 Am. ed. (p. 75 Edin. ed.).

MUSHROOM, the name given to the umbrella-shaped fungi, of the order *Hymenomycetes*, sub-order *Agaricini*, many species of which are edible. Those supposed to be poisonous are ordinarily called toadstools, but this covers many that are really edible, and there is no clear distinction between the two titles. Strictly speaking the mushroom is a single species, *Agaricus campestris*, which alone is eaten to any extent in this country, where all other species are known as toadstools. In Europe, on the contrary, many species are eaten, and known as mushrooms; while in Italy, where mushrooms are eaten abundantly, there is a strong prejudice against our common species. Of the genus *Agaricus* there are more than a thousand species, of which a considerable proportion are supposed to be harmless or edible, while several are commonly used as food. The character of many species has not been satisfactorily ascertained. *A. muscarius*, a Kamchatkan species, is highly prized by the natives from its property of producing a peculiar intoxication. A state of decided drunkenness can be produced by the mastication of a small piece of this plant.

The Agarics may be distinguished from their bearing an umbrella-shaped, fleshy cap on a distinct stalk, the under side of the cap displaying a number of parallel vertical plates or gills, which bear the reproductive spores. They inhabit meadows, heaths, rocks and masses of decaying vegetation throughout the temperate regions. The species are often very similar. There are some general characters which may aid to distinguish the edible from the poisonous species. The edible grow solitary, in dry, open situations. They are generally white or brownish. Their flesh is compact and brittle. They do not change color when cut or pinched. The juice is watery and the odor agreeable. The taste is not bitter, acrid, salt, or astringent. The poisonous grow in woods and damp places, often in clusters. They are usually bright colored. The flesh is tough, soft, and watery. They change to a brown, green, or blue tint when cut and exposed to the air. The juice is often milky. The odor is commonly powerful and disagreeable. The taste is acrid, astringent, acid, salt, or bitter. It must be said, however, that these indications are by no means absolutely trustworthy, and that some species which belong to the first category are very poisonous, while others which have some of the second list of characters may be safely eaten. The common mushroom is not difficult to distinguish by those acquainted with its characters. Its white, rounded top, its purple spores, its gills at first of a delicate pink, afterwards of a purple hue, and the permanent ring or collar around its stem, are easily recognizable characters. Yet there are some dangerous species, which approach it in these characters, and there are certain rules necessary to remember. It must *not* be sought in woods, but only in open pastures, and to be safe it must possess its characteristic fragrance. All edible fungi must be eaten young. If too old the safest may become dangerous. A large species, known as the Horse mushroom, is much eaten in England. It has a stronger flavor than the common mushroom, and sometimes grows to enormous size. Yet the two species are said to approach each other and shade together.

Many experiments have been made with the fungi of America, in respect to their edible or non-edible character. Dr. Curtis, of North Carolina, gives in his catalogue 111 species of edible fungi found in that State. *A. amygdalinus*, when cooked, he says, is scarcely distinguishable from the common mushroom. *A. cæspitosus* is found in enormous quantities, a single cluster containing 50 to 100 stems. Though edible, it is not very palatable. The imperial (*A. cæsarius*) grows in such quantities in oak forests that it may be obtained by cart-loads in its season. It is very unpalatable. He says that hill and plain, mountain and valley, woods, fields, and pastures abound with a profusion of good, nutritious fungi, which are allowed to decay because people do not know how or are afraid to use them.

Other experimenters in this same field are Julius A. Palmer and Charles McIlvaine, each of whom has described edible species. The results of their observations on American fungi may be briefly given. In addition to the Agarics there are three other tribes which yield edible fungi. One of these is the *Polyporei*, or at least its sub-tribe, the *Boleti*, which grow on the ground, with a distinct stem, while the *Polyporei* generally grow on trees, with aborted stems. Their distinguishing character is the presence of sponge-like pores, in place of gills, on the under surface. The third tribe, the *Hydnei*, is distinguished by spikes or stalactite-like arrangements on the under surface. The fourth tribe, the *Lycoperdon*, or Puff-Ball tribe, does not open like the others, but remains closed and of an egg-like shape.

Mr. McIlvaine says that, so far as his experiments go, the Polyporei, Hydnei, and Lycoperdon are all edible, the latter being very delicate. But Mr. Palmer specially warns against the bright-colored Boleti as poisonous. There are very probably many species of all these tribes which have not been tested, and great caution must be observed in dealing with unknown species of fungi, whatever their appearance or affinities. Mr. McIlvaine recommends as edible Agarics the following: *A. rubens* has a funnel-shaped top of color varying from green to white. The gills are white, the stem white or stained. It grows under oaks and beeches. *A. rubescens* has an umbrella top, colored of all shades of brown from the lightest to the darkest. There are warts or scales on the surface. The gills are white. *A. vaginatus* has a stem sheath under or at the surface of the ground, and a bulb on the lower stem. The top is scaly, white or brownish, the gills white and wide, the flesh white, with no change of color when pinched. It occurs solitary, in woods. *A. comatus* is very common, and occurs on most lawns and on or about old stumps and trees. Its top is of all shades from white to brownish, yellow, gray, and mouse color. Its gills vary from white to jet black. There is a white fringe hanging from the outer edge, or as a ring around the stem. *A. ostreatus*, the oyster mushroom, looks like an oyster, and grows on the poplar and oak, and on most kinds of dead wood, in masses of from 6 to 20 inches in diameter. The gills are white, or nearly so, and run down the stem. It is good only when very young. *A. oreades*, the nymph or fairy-like, is a little brown-topped species, an inch or less in diameter, found almost anywhere on the sod, with widely-separated gills of dusky hue, the stem thin, white, and twisted. It is good only when young and after rain or dew.

He specially warns against a small family of Agarics called *Amanita*. It is a handsome family, and gives no indication of its deadly properties, but invites by its beauty. It is pure white in color, with umbrella-shaped top, a skin satiny, or sometimes like white kid, with a yellow or brownish tinge towards the centre. On it are soft shredded patches of what was its covering when young. It has little smell, pure white flesh, and does not change color on cutting or pinching. The top resembles that of the common mushroom. The gills are pure white. The stem is long, white, tapering from bulbous bottom to top. A kid-like apron surrounds the stem near its top, which vanishes with age. In the ground there is a white sheath around the stem. All mushrooms with these characters should be avoided, as well as all growing in woods or under trees, and all with any of the doubtful characteristics above given.

In fact it is never safe to gather mushrooms for the table until one has the characters of the edible species firmly fixed in his memory, and knows them from observation. There is no test of any kind that will positively distinguish the edible from the dangerous species to the eye, and it is safest in this country, where such food is not yet a necessity, to leave all alone but the common mushroom, probably the most palatable of the whole tribe. The latter also may be cultivated so easily, and in such profusion as to constitute a cheap and abundant source of food, and render unnecessary any dangerous trifling with others. They are cultivated in large quantities in caves in France, and are also susceptible of cultivation in the open garden, or in boxes in sheds or houses. For garden-growth beds of earth mixed with horse-dung, and raised into ridges, are made. The mycelium of the mushroom is introduced and the bed covered with loam, and protected by sheds, or hay and straw, to check rapid evaporation. For house cultivation boxes may be filled with alternate layers of horse-dung in a decayed state, and straw, covered with a surface layer of fine mould. There are many modifications of these methods in practice. In both cases the growth of the mushroom is often left to chance, it being almost certain that the dung will contain some of the mycelium (the product of floating spores). To make sure of quick and plentiful crops the earth must be taken from ground rich in mushrooms, or the mycelium be planted in it. This is gathered from mushroom pastures, or produced by cultivation.

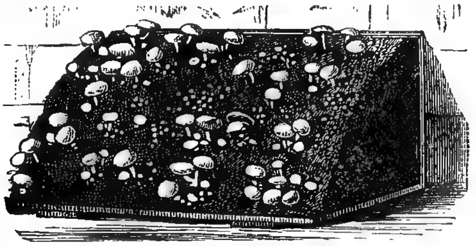


FIG. 1.—Mushrooms on Shelves.

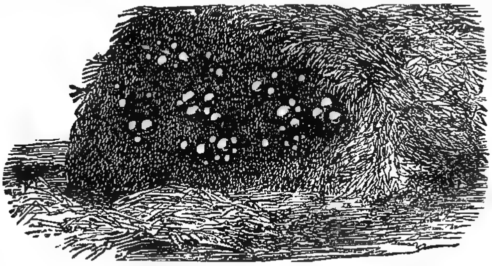


FIG. 2.—Mushroom Bed.

Mushrooms are used for two purposes: as an article of food (in which cases some species may be dried for winter use), and in the making of catsup. For the former purpose the unclosed buttons are safest and most delicate. For the latter they may be used in an older state, and several species which are not very palatable as food serve well for catsup. It is claimed that there are but two proper ways to cook mushrooms. In the one case they are stewed in milk like oysters. In the other they are broiled, this being the best method with most species. In no case is it safe to use strong condiments in cooking or eating them, and thus disguise the natural taste of the fungus, as it is by this that the accidental introduction of dangerous species may be most easily detected. It is said that in China and Japan dried fungus is a very general article of winter diet. It is perhaps the best substitute for meat that can be found in the vegetable kingdom, since the fungi approach animal tissue in organization and mode of nutrition much more nearly than ordinary plants.

In case of the eating of dangerous fungi Mr. McIlvaine recommends olive oil as the best antidote. If a burning sensation at the back of the mouth, colicky pains, or dizziness, follow the eating, he says that a wine-glass of oil, mixed with an equal quantity of whiskey or vinegar, is the best remedy, and that this should be continued till relief is experienced. It is important that some good remedy should be known, as mushrooms of too great age may produce unpleasant effects, while there is always a possibility of dangerous species becoming mixed with edible ones. (C. M.)

MUSIC. Musical culture in the United States is the offshoot of European music. It first took root, on this side of the Atlantic Ocean, in two different sections, East and South-east; and as to its character, in two different directions, the *sacred* and the *secular*. The sacred was represented by the Puritan psalm-tune, the secular by the English ballad, the ballad-opera, and a sprinkling of instrumental music, consisting mostly of dance-tunes and marches; the first of these struck root in the soil of Massachusetts, and prepared the field for the ultimate cultivation of the sacred drama, the oratorio; the other appeared in connection with plays as first put on the American stage, especially in Philadelphia, Baltimore, and New York. To be sure, the cultivation of the psalm-tune and other elementary forms of church music also received some attention in these latter cities, but not so exclusively as by the New England Puritans.

See Vol. XVII. p. 84 Am. ed. (p. 77 Edin. ed.).

The first settlers in the Eastern colonies having been English, the style of such music as they sang and played was a reflex of English musical culture. The psalm-tune, being naturally assigned a place in connection with religious worship, became, for a long period in the life of the New England colonists, the cherished sacred song of the people, and, towards the end of the eighteenth century, aroused some descendants of the Puritans to write new tunes in imitation of the English models. The English hymn-tune, as accepted by the New England congregations, exercised in another direction a beneficial influence on American musical life. Being based on an elementary art practice—simple harmonization for three and four parts to be sung by a choir—the more musically gifted members of congregations began to form choirs for the study and rendering of those harmonized tunes. This led to the establishment of amateur church choirs, which eventually became distinct institutions within the congregations. The meetings intended for the practice of psalm-tunes were at first designated as *singing-schools*, organized for mutual instruction in the art of reading notes, and elementary chorus practice; but they became eventually of such importance that they assumed the character of regular rehearsal evenings for musical recreation. Out of these meetings grew the sacred concert as given, at the end of the last and beginning of this century, in Boston and other New England towns. The study of the four-part psalm-tune led to that of the florid anthem as cultivated by English musicians. This form, sacred in name, and most secular in character, became the goal of the New England psalm-tune singer, who was no longer satisfied with the mere singing of the English product; he tried his hand at imitating the form of the harmonized psalm-tune and the anthem. W. Billings (1770) and other singers, well versed in the then existing music, were the first to make practical attempts in America at the setting of tunes and anthems, in order to provide the increasing singing-schools with a series of new pieces. Though their lively "Fugues" were rather crudely harmonized, they were greatly enjoyed by the members of the singing-schools. But the musically sober minds of the congregations found the tunes of Billings and his contemporaries of too secular a cast; a reaction gradually set in in the interest of simpler and more devotional musical settings. Billings' music, with the exception of a few tunes, was finally set aside. And yet, in principle, these early Yankee singing-teachers were right. They instinctively cultivated, in their crude manner, the very foundation of all musical art, viz., contrapuntal forms, of which the modern fugue is a most important factor. They endeavored, though with rather unsatisfactory results, to impart to the different parts of their "fugued tunes" individual life and motion. Had instrumental music and the secular forms of vocal music then been as widely cultivated in New England as the psalm-tune, there is no doubt some of those busy psalm-tune singers would have found a fitting outlet for their desire to compose new, lively pieces, and instead of singing their secular tunes in connection with sacred words, they would have found the right place for them outside of the church, and the art of composing in America, growing naturally out of the attempts of those enthusiastic psalm-tune singers, would have commenced three-quarters of a century sooner. But this early awakening of the right spirit of musical composition in New England was checked for want of encouragement and understanding on the part of the people, and the lively, spirited music of Billings and his contemporaries had to give way to the prosy, sober tunes of Mason, Hastings, and others of that type. This kind of simple music, based on the most elementary rules of harmony, offered the American composer, almost up to our time, his only opportunity for original musical production. The distressing monotony of those stereotyped phrases of two and four bars with the ever-recurring fossilized cadenzas, must have exercised a depressing influence on the awakening mind of the young native musician, who, if desirous to compose, was forced to run round in the same tread-mill, finding no scope for the study and practice of large artistic forms.

The singing-schools, however, continued to flourish all through New England, and in 1815 the most important of these was established in Boston—The Handel and Haydn Society. At that time people who took interest in musical matters became acquainted with some of the great oratorio choruses of European composers, which had been produced in London. English singers, organists, and musical amateurs began to visit, or to settle in, Boston, the capital of New England. They taught the members of singing-schools the English manner of rendering Handel's and Haydn's choruses, as well as that of the anthems by English church composers. The first members of the Handel and Haydn Society were mostly recruited from among those newly-emigrated English musical amateurs. The first important step in the annals of the society was the production, in 1818, of Handel's *Messiah;* a year later followed that of Haydn's *Creation.* The most important sacred compositions of the great oratorio composers were then successively studied and produced; the whole artistic movement concentrated, in 1857, in the holding of the first grand musical festival at Boston, and in America; at least the first that wholly deserved that name.

While New England's active musical life, as based on the forms of sacred music, clustered round the Boston Handel and Haydn Society, New York, the rising metropolis of the Middle States, and eventually of the whole North American continent, became the seat of more universal culture, the secular predominating. English theatrical companies, sometimes including members possessing some practical knowledge of singing, varied their theatrical performances by the production of popular English ballad operas. It thus happened that English singers of reputation, like Mrs. Oldmixon, Miss Broadhurst, Incledon, and Philips, found their way across the ocean and appeared on the American stage and in concerts. All these musical performances prepared the way to a certain degree for the introduction of the Italian opera, then universally cultivated in Europe. On Nov. 29, 1825, the elder Garcia's company performed for the first time in America a genuine Italian opera. This opera was Rossini's charming *Il Barbiere*, sung by a company of excellent Italian artists, including the afterwards celebrated Malibran. This was a great event in the annals of American musical development. From that time until to-day Italian music kept its position in a certain degree, especially in New York. Though, as was naturally to be expected, it never for any length of time succeeded in gaining a permanent foothold here, the methods of the Italian opera being in general foreign to the artistic tendencies of the American people at large, yet after its first introduction on the stage of New York, season after season operatic companies, under some speculative manager, visited the States. Thus it happened that the greatest of European lyrical artists—Italian, French, German, English—were induced, on the strength of extraordinarily high terms, to appear in New York. New operas, as produced in Italy, Paris, Vienna, London, were thus introduced on the American stage in order to afford the new singing stars opportunity to shine in their most brilliant light. Here are the names of some of the principal of those distinguished singers: Alboni, Amodio, Badiali, Biscaccianti, Bishop, Bosio, Braham, Brignoli, Campanini, Capoul, Fanti, Formes, Galassi, Garcia, Grisi, Laborde, La Grange, Lind, Lucca, Malibran, Mario. Maurel, Medori, Nilsson, Parodi, Patti, Pyne, Santley, Shireff, Steffanone, Sontag, Tamberlik, Titiens, Wachtel, Wood. Although opera managers, for want of necessary encouraging appreciation of their efforts on the part of the American people, encountered financial disaster after disaster, the operatic enterprise seemed to exercise such a fascination for some people that there were always persons to be found, in spite of those warnings, to embark in it. It is not an exaggeration to say that every manager who provided the New York stage with Italian opera retired from the precarious business, if not a wiser, at least a poorer man.

However, the influence of the Italian opera on American musical development was a very beneficial one. The performances of the great singers, in opera as well as in the concert room, helped to form the taste of the audiences, and singing became for a time the predominant musical occupation of the American amateur. Whether the music of Rossini, Bellini, Donizetti, Verdi, Mozart, Meyerbeer, Weber, Auber, Boieldieu, Gounod—to mention only the principal opera composers—left any deep marks upon the mind of those American musical students who came under its influence, and who evinced a desire to compose operas, remains an open question. There was then, as now, no convenient opportunity, no encouragement, for the production of indigenous works. So many different qualities are required in order to become a successful opera composer. The mounting of an opera, even on a small scale, is such an expensive affair that a manager will never be found to accept for performance a lyrico-dramatic work composed by a musician who lacks all stage experience. Pretty melodies are not sufficient to keep up the interest in a lyrical play.

The periodical importation of Italian opera was also beneficial in another direction, viz., the cultivation of instrumental music. Efficient orchestral players were needed to do justice to the instrumental accompaniments and incidental pieces, such as overtures, marches, ballets; and as this class of musicians, at the time of the first opera ventures, were not yet to be found in New York in a sufficient number, opera managers were forced to engage them in Europe; and thus it came to pass that able band-players found their way across the Atlantic Ocean, and after the disbanding of the opera companies settled for the greater part in New York or some other American city. In 1842 the orchestral players residing in New York were induced to organize, on the model of the London Philharmonic Society, a symphonic orchestra for the cultivation and performance of purely instrumental music by the best composers. The works produced by the Philharmonic Society since its first concert, Dec. 7, 1842, include nearly all the instrumental compositions of the classic and romantic masters up to our time. The Philharmonic orchestra proved to be a great training-school both for instrumental players and musical amateurs. The Philharmonic Society has proved, during its long existence, a model to many other orchestral organizations. This society, sometimes prosperous, sometimes brought to the brink of financial disaster, often persecuted and conspired against, often poorly managed, injudiciously advised by timorous, prevaricating officers, repeatedly used by others for private purposes, has nevertheless maintained up to the present time its well-deserved important artistic position among the great musical societies of the world.

From the outset each one of the above-mentioned cities, Boston and New York, impressed upon its musical culture a distinct character, representative of the innate spirit of its inhabitants. Boston, the former stronghold of New England Puritanism, wasted years of labor on the question of "What is the right form of church music?" and issued collection after collection of weak psalm-tunes; but, to its credit be it said, Boston first became alive to the noble idea of introducing the teaching of elementary vocal music in its public schools. That broad-minded educator, Woodbridge, about 1830, warmly advocated the movement, having personally seen its working in European public schools. In 1838 a beginning was made in some Boston schools, and gradually all public schools in the town had their regularly set elementary singing lessons. Vocal music thus became the property of the masses of the people, for almost every city throughout the Union has introduced it in its public schools.

Some earnest, enthusiastic Boston amateurs labored for years to establish in their city a well-organized orchestral society, but only met with partial success. To be sure they had, successively, a Musical Fund Society, a Philharmonic Society, the Harvard Musical Association Orchestra, but these all disappeared after some years of existence. In 1880 a rich Bostonian, Mr. Higginson, decided to engage a well-equipped orchestra for the purpose of giving, during the winter season, weekly concerts, taking upon himself the risk of paying the deficit that might grow out of such a venture. The orchestra, under the name of the Boston Symphony Society, is still in existence, and, under its efficient conductor, Mr. Gericke, is doing excellent artistic work, highly beneficial to the cause of instrumental music in Boston. Besides these two musical societies, the Handel and Haydn and the Symphony Society, a number of smaller musical organizations are now to be found in the city and its immediate neighborhood.

New York, inhabited by a cosmopolitan population, continually recruited from all parts of the world, has always shown a cosmopolitan musical spirit; there are to be found oratorio societies, glee-clubs of mixed and male voices, Italian, French, German, and English operatic performances, orchestral organizations, chamber music clubs, etc. The introduction of elementary music in the public schools never received much serious attention in New York. There it has been left to the tender mercy of those who, in whatever way, manage to be appointed as teachers. Among the numerous different choral organizations, The Oratorio Society, the Vocal Union, the German Liederkranz, the Arion Society, the Mendelssohn Glee-Club, are the principal ones; among orchestral organizations besides the celebrated Philharmonic Society, the Symphony Society, in which the late Dr. Damrosch was active, and the popular Thomas Concerts may be mentioned; the cultivation of chamber music is represented by the Philharmonic Club and the Standard Quartette Club. The New York Philharmonic Society also furnishes the orchestra for the performances of the Brooklyn Philharmonic Society.

The Italian opera, which, a few years ago, was all popular, has now entirely lost its hold on New York in spite of Mapleson's strenuous efforts to keep it alive; people have grown tired of the one-sided, expensive affair. A reaction has suddenly set in in favor of grand opera as cultivated by German and French composers, and especially the modern Wagner music drama. In November, 1885, the late Dr. Damrosch opened the Metropolitan opera-house with a competent company of German singers. The season was opened with Wagner's *Tannhäuser.* Through the almost superhuman efforts of the able director the venture proved a success. The following operas besides the above were brought out during the season: *Fidelio*, *Huguenots*, *Freischütz*, *William Tell*, *Lohengrin*, *Don Juan*, *Le Prophête*, *Massaniello*, *Rigoletto*, *La Juive*, *Die Walküre.* The performances were remarkable for their excellent ensemble and well-managed *mise en scène.* But just as the season was approaching its end the main spirit of the enterprise, Dr. Damrosch, was stricken down by death. However, the good artistic work he intended to do proved lasting, and during the season of 1885–86, under the direction of Mr. Seidl, one of the most efficient conductors of the Wagner drama, and the ablest among American resident conductors, a series of opera performances unparalleled for their general artistic excellence in the annals of American operatic affairs took place at the Metropolitan opera-house. The following operas were given during the season: *Lohengrin*, *Tannhäuser*, *Die Walküre*, *Die Meistersinger*, *Rienzi*, *Queen of Sheba.* The Metropolitan opera enterprise will be of far-reaching influence on musical culture in the States.

In the Western States musical development is also progressing favorably; there a large and active German population may be found assiduously cultivating the German manner of male chorus singing, and there is probably no small Western town which has not at least one Männerchor. Of course, in every large city like Chicago, St. Louis, St. Paul, Detroit, etc., etc., chorus societies exist, organized on the model of the Boston Handel and Haydn Society. But so far musical culture has been placed on the most permanent basis in Milwaukee, whose German settlers from the beginning aimed at a higher development of musical art. In 1850 they organized the Musik-Verein (Musical Union) after the model of such societies as established in large musical centres throughout Germany, and it is still in a flourishing condition. All through the West and North-west the German male chorus societies aré bound together as a large organization to meet annually in one of the towns for the holding of grand musical festivals. Choruses for mixed voices are also now being formed among them. In fact, annual or biennial musical festivals are still the rage in all Western cities where a choral organization is to be found. This is, in most cases, not done from an innate, genuine desire to foster a taste for musical art pure and simple, but for speculation's sake. Some crafty Eastern manager-conductors, through their agents, work up the matter in a large Western city; an artificial excitement in the interest of the enterprise is thus created, and a musical spree on a large scale is run through, lasting a whole week, with two concerts every day. Cincinnati reached this stage of speculation in musical festivals when in 1873 the holding of biennial festivals was resolved on. Mr. Thomas has so far conducted these festival concerts. The holding of one such biennial festival seems to exhaust the resources of the people of Cincinnati to such a degree that there remains neither pecuniary means nor any artistic desire to foster home organizations, orchestral or other musical societies endeavoring to do some good work towards creating a true and durable taste for good music among their townsmen. However, a wholesome reaction seems to be setting in. Since 1884 an orchestral society, composed of band-players of that city, has been giving, during the winter season, a course of concerts with good programmes. As long as large, flourishing cities do not find means for the establishment of permanent orchestral organizations, even on a moderate scale, their chorus societies will have no incitement to study and produce important choral works; for such works, performed without the necessary instrumental accompaniment, will not give an adequate idea of their artistic beauty and poetical meaning; and then, what musical treasures are to be found in the literature of instrumental compositions! Surely a city that claims to be a musical centre, yet is without an effective home orchestral organization, has no good title to such a claim.

Musical instruction is now receiving more serious and artistic attention on the part of numerous efficient teachers dispersed throughout the States. For every American city one or more music schools (conservatories) are to be found; musical professorships are established at some of the most important male and female colleges. All this gives proof of a genuine desire on the part of the people to cultivate music as one of the most effective of the fine arts—the modern art *par excellence*.

Among musical instruments, the pianoforte receives almost exclusively the attention of young musical students; some fine pianists, men and women, have made their mark on the American platform. A number of well-trained American singers have met with success in Europe as well as in their own country.

Among orchestral instruments, the violin, the violoncello, the flute, and the cornet are the most frequently cultivated by American amateurs; but this, in most cases, is done for home recreation, orchestral bands depending on the European supply in order to fill their ranks with efficient players.

A wholesome progress is also noticeable in the cultivation of church music. The new hymn-tune collections, issued at the present time, contain a larger number of musically better tunes than formerly; the harmonic setting of the tunes is done more in accordance with the correct technical knowledge of the subject, and with better taste. Though inspiring congregational singing is still neglected by many Protestant churches—the slender choir quartette being still hired to do devotional singing for the congregation—in some churches, nevertheless, efforts are being made in the right direction by encouraging congregational singing. Many congregations, in small and large towns, have, with great liberality, provided their places of worship with beautiful organs, often presided over by able organists. And what can be more inspiring, and, from a devotional point of view, more elevating, than the hearty singing of a whole congregation, old and young, to the strains of the "king of instruments." The present style of sacred music forming an integral part of the liturgy of the Episcopal Church, is far more appropriate and effective than it was formerly. In Roman Catholic churches the fine masses and other liturgical pieces written for the express purpose of devotional music, are replacing the sentimental, flashy, secular strains, that, only a short time ago, still found their way into religious service.

To the study of the art of musical composition more attention is now being paid than ten years ago. Though the field for the composer is still a very restricted one, a good deal of progress in the right direction is already noticeable. Thus far the light ballad, the different forms of dance-tunes and other primary forms set as pianoforte pieces, the psalm-tune, the rather superficial anthem, were most frequently cultivated, for the simple reason that, there having been no demand for more artistic compositions, publishers did not care to publish any different style of pieces. Though the chances for public production are still slender in the United States, composers are nevertheless devoting some of their efforts to the writing of works in large, complex forms, such as the symphony, and other instrumental pieces, the cantata, the oratorio, and even the opera. In looking over the whole field of musical culture in the United States, great activity and encouraging progress is everywhere to be perceived; promising, perhaps, in the near future, a rich harvest of national and artistic works.

(F. L. R.)

MUSKEGON, a city of Michigan, county-seat of Muskegon county, is situated on Muskegon Lake, a handsome sheet of water formed by the Muskegon River near its mouth in Lake Michigan, which is 4 miles from the town. The Muskegon Lake forms a capacious and excellent harbor. The city is 14 miles N. of Grand Haven, and is at the junction of various lines of railway. It has numerous fine churches, a high-school, an opera-house, county buildings, gas-works, 1 daily, and 3 weekly newspapers. The chief business is the manufacture and shipment of lumber, vast numbers of logs coming down the river by flotation to the town. Besides the lumber-mills, there are machine-and boiler-works, foundries, car-shops, and other manufactories. The town was settled in 1836, and received its city charter in 1870. Its population in 1870 was 6002; in 1880, 11,262; and in 1885, 17,485.

MUSK-RAT, one of the best known of American rodents, has a wide range in the northern part of North America. It is found from the Atlantic to the Pacific and from the Rio Grande to the Arctic seas. Fortunately for the rice-planters of the South it is not found in the alluvial lands of the South Atlantic States, where its burrowing habits would cause serious trouble. As it is, it frequently causes damage by piercing the banks of reservoirs and streams and letting out the water. The musk-rat is a nocturnal animal, awkward in its movements on land, but very agile in the water. In its habits it approaches the beaver, burrowing in banks below the water level, and leading up to a nest above the reach of freshets, where, in some cases, it builds a mound of sticks, etc., approaching the beaver's lodge in character. It feeds on grasses, roots, shoots of water-plants, etc., sometimes on mussels. It is very prolific, producing from 12 to 18 young yearly. The fur of the musk-rat is short and downy, and was formerly much used by hat makers as a substitute for beaver. Hundreds of thousands of skins were sent annually to Europe, where it was known as "river sable." It has now greatly declined in value. The musk-rat is still actively hunted, as much from the injury it causes as for any economical purpose. Its favorite locality is a grassy marsh, or the banks of a sluggish stream or lake. Here it is taken in traps, shot, or killed by dogs, who dig out its burrows. In the far North-west large numbers are taken by the Indians, who make this an important part of their life occupation.

MUSPRATT, James Sheridan (1821–1871), an English chemist, was born at Dublin, March 8, 1821. He studied chemistry at the Andersonian University, Glasgow, and when only sixteen years of age became chemist for a large manufactory at Manchester. He emigrated to the United States, but did not succeed in business. He then went to Germany and studied chemistry at Giessen. He made many discoveries in organic chemistry. Settling in Liverpool he founded the Liverpool College of Chemistry. In 1848 he married Miss Susan Cushman, sister of the more celebrated Charlotte Cushman (*q. v.*). He died at West Derby, Feb. 8, 1871. Among his works are *Outlines of Qualitative Analysis* (1849), and a *Dictionary of Chemistry* (1854).

MUSSET, Paul Edme (1804–1880), a French author, was born at Paris, Nov. 7, 1804. He was brother of the poet Alfred de Musset (1810–1857) (for whom see Encyclopædia Britannica). He is chiefly known by his novels, which are noted for their elegance of style. Among them are *La Téte et la cœur* (1834); *Anne de Boleyn* (1836); *Femmes de la Régence* (1841); *Jean le Trouveur* (1849). On behalf of his brother he wrote *Lui et Elle* (1859) in reply to George Sands' *Elle et Lui*. He edited his brother's works and published his biography (1877). He died at Paris, May 17, 1880.

MUSSEY, Reuben Dimond (1780–1866), an American surgeon, was born at Pelham, N. H., June 23, 1780. He graduated at Dartmouth College in 1803, and at the Philadelphia Medical School in 1809. After practising at Salem, Mass., he was made professor of physics at Dartmouth College in 1814, and in 1819 was transferred to the chair of anatomy and surgery. In 1838 he accepted a call to a similar chair in the Ohio Medical College, and in 1852 took a professorship in the Miami Medical College. In 1860 he removed to Boston, where he died June 28, 1866. Dr. Mussey was noted for his bold and successful operations. He was the first to tie both carotid arteries. In 1837 he removed the entire shoulder-blade and collar-bone of a patient suffering from osteosarcoma. He was an early and earnest laborer in the temperance cause. Among his publications was *Health; Its Friends and Foes* (1862).

MUSTANG, the small wild horse of the South-western United States and Northern Mexico, where it occurs in extensive herds, and is captured and domesticated as the *Indian Pony*. At present wild horses are found only in three regions of the earth—the locality mentioned, the extensive pampas of South America, and the plains of Tartary in Asia. The Tartar horse may possibly be the direct descendant of the original wild horse, though it is not sure that any such now exist. In America it is certain that the existing wild horses are reversions from domesticated stock. Though we have abundant geological evidence that horses existed in America until a late era, they seem to have completely vanished before, or early in, the human epoch, and this continent has been restocked with horses from Europe. There are certain particulars in which all wild horses agree, those of Asia and America alike. They are of small size, the mustangs seldom exceeding 13 hands high. The large size of some domestic horses is a result of selection. Mustangs lack the fine proportions of the domestic horse, and have large heads, heavy limbs, and a frizzled and bushy mane and tail. These would seem to have been characteristics of the original horse, and to have been regained by the present wild horse through reversion.

It is supposed that the mustangs are descendants of Spanish horses which escaped from domestication in Mexico, and became the parents of the immense herds which afterwards occupied the plain and prairie regions to the north. It is not easy now to decide on the source of the Indian ponies. Those of the south-western tribes are undoubtedly mustangs. Those of the north and north-west region may be the descendants of horses escaped from the English and French colonists. In addition to the characteristics mentioned, these horses are very active and strong, with remarkable powers of endurance. They display a lofty crest and a proud carriage, are sturdily built, and have legs and feet of the most lasting character.

The mustangs congregate in great herds, seemingly under the guidance of a single leader, who seems in some way able to convey his orders to the whole herd. Though the jaguar, puma, and wolf infest their region, they care little for these, trusting to union for safety. The most ferocious animal will not venture to attack a troop of wild horses, and it is not easy to understand the cause of the annihilation of the native horse of America. The constant hunting of the mustangs by the Indians of the South-west Territory has made them exceedingly shy and watchful. They fly on the slightest alarm, under the guidance of the old stallion, their leader. They avoid thick forests and woody morasses, and keep to the broad, open plains or prairies, where no peril can approach them unseen. There is no more noble sight in nature than that of a troop of wild horses sweeping over the broad levels, with a motion as if the whole troop was a single body moved by a single will.

The mustang is always a strong and useful animal, easily broken to the saddle, and much sought after, from its serviceable character and its peculiarly hardy and powerful frame. They are occasionally brought East, where, though not handsome, they are esteemed for their unusual endurance and the great amount of labor they can perform on moderate fare. It is not easy to kill out the wild strain in them, however, and they occasionally break out in a sudden frenzy, which, in the herding and caravan regions of the West, is apt to extend to a whole mass of horses and cattle alike, and cause a *stampede* which it is almost impossible to overcome.

Two modes of capturing the mustang are practised—with the lasso and the rifle. The latter needs a marksman of unusual skill, as an inch play of the bullet will either miss or kill the animal. The process is called *creasing*, the object being to graze the skull just behind the ear. The blow stuns the animal for a short interval, and ere it can recover from its bewilderment, the hunter pounces upon and secures it. The ordinary method is that of the lasso. This can be thrown with great precision from a distance of 30 feet, and is a highly effective weapon in practised hands. The lasso is a carefully plaited rope of green hide, of which one end is fitted with an iron ring, while the other is fastened to the saddle. When used, the hunter throws the coil of rope over his left arm, and makes a slip-noose by aid of the ring. Grasping the ring and cord in his left hand to keep the noose from slipping, and the centre of the noose in his right, he is ready for action. The large noose, 4 or 5 feet in diameter, is swung around his head and hurled outwards, the weight of the iron ring giving it a powerful impetus. As the noose flies through the air it gradually contracts in diameter, so that its original size must be nicely adjusted to the distance of the throw. When caught, the mustang is savage and furious, but its plunging and struggling tightens the lasso around its neck so as to nearly strangle it, and forces it to halt and gasp for breath. The hunter now dismounts and approaches, keeping the lasso tight. Reaching the head of the captured animal, he seizes the muzzle and blows strongly into the nostrils. This process, as practised by the Comanche and other Indians of the South-west, is said to have a remarkable influence upon the animal, which becomes quiet and subdued, and readily submits to captivity. The fractiousness which they often display after domestication is probably due to imperfect breaking. It is likely that a degree of gentleness arising from the domestication of its ancestors has its share in the easy subjection of the mustang to the saddle.

The similarity in character and condition of the wild horses of South America to the mustangs of the North calls for a few remarks here in reference to them. These herds are ascribed by Azara to the escape from control of 5 horses and 7 mares, of Andalusian blood, at the time the inhabitants suddenly abandoned the city of Buenos Ayres in 1535. These animals were left on the plains, and are supposed to have given rise to the vast herds which people the immense grassy plains which lie south and west of the Rio de la Plata. Others which escaped from the settlements north of the river gave rise to the herds of Paraguay and the interior. The wild horses of this region are much more numerous than those of North America, from the much greater extent of their grazing grounds. They are said to congregate in little groups, of a stallion and a number of mares. But they sometimes combine into herds of many thousands in number, which show signs of union and subordination, and are led by one or a few of the older stallions. They often entice domestic horses into their troop, and these never willingly submit to subjection again.

The mode of capturing them is much more cruel than that practised in North America. The lasso is used, but the guachos of the Pampas handle it in such a manner as to fling the captured animal with great violence to the ground. If caught by the legs, these are jerked violently aside, so that the animal falls heavily. Instantly the guacho seats himself on its head. Others gird on the saddle and force a bit into the mouth. The animal is then suffered to rise, but the guacho is on its back and cannot be thrown by any effort. When the struggling captive has become exhausted by its unavailing efforts, the cruel guacho spur is applied, and it is kept going until thoroughly subdued. A guacho, on a journey, will capture fresh horses and release the exhausted ones as he goes. Though not swift-footed, these animals have great endurance, and are said to be sometimes ridden 60, 70, or even 100 miles in a single journey. (C. M.)

MYER, Albert James (1828–1880), an American general, was born at Newburg, N. Y., Sept. 20, 1828. He graduated at Geneva College in 1847, studied medicine at the University of Buffalo, and in 1854 became assistant surgeon U. S. A. In 1858 he became connected with the signal service, and in 1860 was made chief signal officer of the army, serving then in the Rocky Mountains. On the outbreak of the civil war he was made signal officer first to Gen. Butler, afterwards to Gen. McClellan. In November, 1862, he took charge of the signal office at Washington. He developed and greatly improved the signal system, and for his services received several brevets besides being made colonel in July, 1866. In 1870 a complete system of weather observation and forecasts was inaugurated by the government. This was fully organized and satisfactorily conducted by Gen. Myer till his death, Aug. 24, 1880.

N.

NACHTIGAL, Gustav (1834–1885), a German traveller, was born at Eichstedt, Feb. 23, 1834. He studied at the Universities of Berlin, Halle, Wurzburg, and Greifswald, and in 1858 became an army surgeon. In 1861 ill health compelled him to resign and he went to Algeria. In 1863 he was volunteer surgeon in the Tunisian army employed against the revolted tribes. He thus obtained the favor of the Bey. In 1868 the traveller Rohlfs deputed him to carry to Kouka, to the Sultan of Bornou, presents from the king of Prussia. In February, 1869, he set out from Tripoli, and then for a time resided in Fezzan. He explored Tibbou and Tibesti, which had never before been visited by a European. He arrived at Kouka, July 6, 1870. He made the tour of Lake Tchad and traversed much of the Soudan. In November, 1874, he reached Cairo, where he spent the winter. Returning to Germany in 1875 he published the account of his travels. He died at Berlin, May 5, 1885.

NADAL, Bernard Henry (1815–1870), an American clergyman, was born in Maryland in 1815. He graduated at Dickinson College and joined the Baltimore M. E. Conference in 1835. He preached in Maryland, Virginia, and Delaware, and was professor in Indiana Asbury University about 1850. He afterwards had charge of churches in New York and other cities, and was for one session chaplain of the U. S. House of Representatives. He was made professor of church history in Drew Theological Seminary at its organization, and was afterwards acting president. He died at Madison, N. J., June 20, 1870. He contributed to *Methodist Quarterly Review* and other denominational periodicals.

NAHUM. See Prophets.

NAPIER of Magdala, Robert Cornelius, Baron, a British general, was born in Ceylon, Dec. 6, 1810, being eldest son of Major C. F. Napier, R. E. He was educated at Addiscombe and entered the Royal Engineers in 1826. He served in the Sutlej campaign in 1845–46, being severely wounded at Ferozeshah. He also served in the Punjaub campaign, 1848–49, and was chief-engineer at the siege of Mooltan. He was chief of staff to Sir James Outram in 1857, and was prominent in the relief of Lucknow at the beginning of the Indian mutiny, and in the subsequent siege and capture of the same city. In the Chinese war in 1860 he commanded a division, with the local rank of major-general. In October, 1867, he became lieutenant-general and organized and commanded the Abyssinian expedition for the relief of British subjects held in custody by King Theodore. For the capture of Magdala, April 13, 1868, which crowned the expedition with success, he was made Baron Napier of Magdala and G. C. B. In 1870 he was made commander-in-chief of India, with the rank of general and a seat in the viceroy's council. In 1876 he was transferred to be governor of Gibraltar.

NAPOLEON, Prince, is the name and title usually given to Napoléon Joseph Charles Paul Bonaparte, the second son of Jerome Bonaparte by his second marriage with Princess Frederika, of Würtemberg. He was born at Trieste, Sept. 9, 1822. After spending his youth in Austria, Switzerland, and Italy, he obtained permission in 1845 to visit Paris under the name Comte de Montfort, but was soon compelled to leave. At the revolution of 1848 he was again in Paris, and having declared himself a Republican was elected to the Constituent Assembly from Corsica. He then belonged to the extreme Democratic party. After being minister at Madrid for a short time he was recalled. Under the Empire he was made a French prince, a senator, and councillor of state. In 1854 he was appointed to a command in the French army in the Crimea, but on account of his sudden withdrawal on the plea of ill health, he obtained the sobriquet of "Plon-Plon." In 1855 he was president of the Imperial Commission of the Paris Exhibition, and zealously discharged his duties. In June, 1858, he was made minister of Algeria and the colonies. In 1859 he married Clotilde, daughter of King Victor Emmanuel, and this alliance was the prelude to the Italian war, in which he commanded the French army of reserve in Southern Italy. In 1865 he was made president of the commission for the Paris Exhibition of 1867, but resigned this position as well as his membership in the Privy Council after being reprimanded by the emperor for a speech delivered in Corsica. His views were more liberal than those of the emperor, and his acquaintance was sought by the most distinguished visitors to Paris. He himself frequently went abroad, and in 1861 he visited the United States. In 1870 he was sent by the emperor to Italy to endeavor to obtain his father-in-law's co-operation in the war with Germany, but in this he failed. After the fall of the Empire he resided for a time in England, and though again elected to the National Assembly from Corsica, was not permitted to return until May 24, 1873. His request for restoration to the list of generals was refused by the ministry of war. At later elections the prince imperial opposed the election of Prince Napoleon, and sometimes with success. On the death of the prince imperial in 1879 Prince Napoleon became the head of the Bonaparte family, but he refused to take any measures as such, and some of the ardent Bonapartists called on his eldest son, Victor (born July 18, 1862), to be their leader. After the death of Gambetta he seemed stirred into momentary activity, but his address excited ridicule rather than alarm, though the government saw fit to imprison him for a few days.

NAQUET, Alfred Joseph, a French chemist and socialist, was born at Carpentras, Oct. 6, 1834. He studied medicine at Paris, taking his degree in 1859. In August, 1863, he was appointed assistant professor at Paris, but before entering on his duties, spent a year in establishing a chemical professorship in the Technical Institute at Palermo, Sicily. At Paris, in 1867, he was sentenced to 15 months' imprisonment. His offence was in organizing the congress at Geneva, in which he proposed a resolution calling the first Napoleon the greatest criminal of his day. Having published a book called *Religion, propriété, famille*, in which he attacked the religious idea of marriage, he was deprived of all civil rights. He then went to Spain, and took part in the revolution of Andalusia. On the downfall of the French Empire, he returned to France and was military secretary to the governments at Tours and Bordeaux. He was elected to the assembly from Vancluse in 1871, and a contest being raised, resigned and was re-elected. He opposed the opportunism of Gambetta, and boldly demanded full political freedom for all classes, liberty of divorce, and many social innovations. He was married in 1862 without the presence of a clergyman, and in 1870 he separated peaceably from his wife because she believed it her duty to give their only son religious training. He has published *Principes de Chimie fondés sur les théories modernes* (1865); *De l'Atomicité* (1868), and has contributed to Wurtz's *Dictionnaire de Chimie* and to scientific periodicals.

NARES, SIR GEORGE STRONG, an English Arctic explorer, was born in 1831, being the son of Capt. W. H. Nares, R. N., of Danestown, Aberdeen. He was educated at the Royal Naval College, New Cross, and entered the navy at an early age. In 1852 he went in the Arctic expedition as a mate on the Resolute, and distinguished himself in the sledge-journeys. After his return he took part in naval operations in the Black Sea. He was lieutenant, and afterwards commander on training-ships. In 1866–67 he was engaged in surveying the Australian coast, and in 1869 in surveying the Gulf of Suez. In 1872 he took command of the Challenger in its famous voyage for deep-sea soundings in the Indian and Pacific Oceans. In 1874, being now knighted, he was called to command an Arctic expedition (for an account of which see ARCTIC EXPLORATION, Vol. I., p. 300). After having reached by sledge-journey 83° 21′ 26″ N. lat., the most northern point attained up to that time, Nares resolved to return. He arrived at Valentia, Oct. 27, 1876, and for his services was made K. C. B. He was again placed in command of the Alert, and sailed in September, 1878, for a two years' survey of the South Pacific. He has published *Naval Cadet's Guide* (1860), republished under the title *Seamanship; Reports on Ocean Soundings and Temperature* (1874–75); *Narrative of a Voyage to the Polar Sea during* 1875–76 (2 vols., 1878).

NARRAGANSETTS, the name of a tribe of Algonkin Indians who, at the era of the settlement of New England, inhabited a district very nearly the same as that of the present state of Rhode Island. They were considerably superior in number to the surrounding tribes, their population being probably 7000 or 8000, but were less enterprising and warlike. They were the most civilized of the New England tribes, and more disposed to endure manual labor. Their wigwams were more comfortable, their canoes more neatly constructed, and in all the ruder arts of life they were in advance of their neighbors. They were also more religiously inclined, and much given to ceremonial dances and other religious rites. In character they were milder and in manners more refined than the Pequots and the Pokanokets, two adjoining tribes, with whom they were at war when first known. They were somewhat thickly settled, having 12 villages within a circuit of 12 miles radius—a fact which indicates some proficiency in agriculture.

The history of their relations with the whites is one of some interest. It began in 1621, when Canonicus, their sachem, sent to the Plymouth colony a bundle of arrows tied with snake-skin—a symbol of hostile intentions. Gov. Bradford promptly returned the snake-skin filled with powder and bullets—a diplomatic movement which seems to have changed the warlike mood of the Narragansetts. Roger Williams, when expelled from Massachusetts, took refuge in their country, and was well received by the tribe, in whose councils he soon gained considerable influence. In 1636 they again manifested hostile intentions, but were won to peace by the persuasions of Roger Williams, who induced them to sign a treaty with the colonists. They aided the English in their subsequent war with the Pequots. In 1644 Gorton induced them to cede a tract of land to the colonists. In 1645 they again became hostile, but were forced to sign a treaty of peace, with somewhat severe terms. Thirty years afterwards, in King Philip's war, the Narragansetts were suspected of secretly aiding their old enemies, the Pokanokets, and were charged with sheltering the fugitives after the death of Philip and the defeat of his tribe. As a consequence war was declared against them, and a force of 1000 English and 150 Mohegans and Pequots attacked and burned their fort. The fugitives were driven to endure the cold of the winter of 1676 with little shelter or food, but their spirit was unbroken, and under the lead of their brave sachem, Canonchet, they made severe reprisals upon their foes. Two war parties of the English were cut off and destroyed, many frontier villages were burned, and numerous settlers were massacred or forced to fly for their lives in long journeys through the snows.

In the ensuing spring, by the aid of Indian allies, Canonchet was taken prisoner, and was shot by the English. A large force was now sent to crush the hostile Narragansetts. They had retired to their chief fortress, built on an island in a region of swamp. This was taken by storm after a fierce defence, and its defenders slaughtered to a number estimated at 1000 men, women, and children. The Narragansetts were nearly exterminated by this disaster. They subsequently remained at peace with the colonists, became civilized, intermarried with the whites, lost their native language, and nearly disappeared as pure-blooded Indians. In 1822 there were 402 of them on their reservation of 3000 acres at Charlestown, R. I. In 1833 they had declined to 158, of whom only 7 were of pure blood. At present there are about 150 of them. A grammar of their language was printed by Roger Williams.

NASH, FRANCIS (d. 1777), an American general, was born in Prince Edward co., Va., and in boyhood was taken to New Berne, N. C. He became clerk of the superior court and served as captain under Gov. Tryon against the regulators at the battle of Alamance in 1771. He was a member of the provincial congress in 1775, and was by it appointed lieutenant-colonel in the Continental army. In February, 1777, he was made a brigadier-general by Congress and served under Washington. He commanded a brigade at Brandywine and at Germantown, where he was mortally wounded. He died Oct. 7, 1777, at Kulpsville, Pa.

His brother, ABNER NASH, was governor of North Carolina, 1780–81, and afterwards a member of Congress. He died at New York, Dec. 2, 1786.

FREDERICK NASH (1781–1858), son of Abner, was born at New Berne, N. C., Feb. 9, 1781. He became a lawyer, and finally judge of the State Supreme Court. He died at Hillsborough, N. C., Dec. 4, 1858.

NASHUA, a city of New Hampshire, one of the seats of justice of Hillsborough county, stands on the W. side of the Merrimack River, at the mouth of the Nashua River, which affords excellent water-power, rendered available by means of a canal 3 miles long. The city is 35 miles S. of Concord, and is at the junction of several lines of railroad. It has a city-hall, county buildings, excellent public-schools, 3 hotels, 3 national and 4 savings banks, 2 weekly and 2 daily newspapers, 10 churches, gas- and water-works. It is an important manufacturing centre. The cotton-factories are on an extensive scale. Among the goods here made are iron and steel castings, machinery, carpets, locks, paper, and other goods in great variety. Total valuation of property, $10,000,000; public debt, $340,000. The place was first settled in 1673, but was of no importance until 1825, when the water-power of the place began to be developed. It became a city in 1853. Population in 1870, 10,543; in 1880, 13,397.

NASHVILLE, a city, capital of Tennessee and seat of justice of Davidson county, is on the navigable Cumberland River, in 36° 9′ N. lat., 86° 49′ W. long. The site is uneven and in part hilly. The city is mainly on the left bank of the river; that portion which stands on the other side, called Edgefield, formerly had a distinct city government; it is connected with the main city by railway and suspension bridges. The State capitol, a handsome structure built of limestone quarried near the spot, dominates the whole scene. It is nearly fire-proof, containing no wood except in some part of its roof. Other public buildings are a court-house, a city-hall and market-house, a State penitentiary, a lunatic asylum, a blind asylum, the custom-house and post-office, the Masonic temple, etc. The town is the centre of many lines of railway, which radiate in every direction, and make it one of the principal centres of railway traffic in the Southern States. Nashville has many fine churches, numerous banks, large hotels and theatres, commodious business houses, and a great number of handsome residences. Three daily and 16 weekly newspapers are published here, besides a number of monthly and fortnightly publications. The city is an important educational centre. The public-school system is well organized. Among the institutions of learning are the Vanderbilt University, under the control of the Methodist Episcopal Church South, having handsome buildings and a large endowment; the Central Tennessee College, a Methodist institution for colored students; Fisk University (Congregationalist), open to youth of either sex, and receiving few except colored students; Roger Williams University (Baptist), also for colored students of either sex, and more numerously attended than any of the others before named; and the State Normal College, which is affiliated with Nashville University. There are medical schools connected with the University of Tennessee, with Nashville University, with Vanderbilt University, and with Central Tennessee College. The two institutions last named have also law courses; and theology is taught in the Vanderbilt, Fisk, and Roger Williams Universities, and in Central Tennessee College. Among the schools for secondary instruction are the Montgomery Bell Academy, controlled by the Nashville University; the East Nashville Academy, and various institutions under the direction of the Roman Catholic diocese of Nashville. The normal college is in part supported by the Peabody fund.

Nashville stands in one of the richest districts in the State, and its wholesale trade accommodates a wide extent of country. Cotton and tobacco are among the leading staples of its commerce. Its manufactures are large and rapidly extending. The town has large cotton-mills, distilleries, furniture-works, oil-mills, paper-mills, machine-shops, tanneries, and other industrial establishments. The city was founded in 1780, incorporated in 1784, and chartered as a city in 1806. From 1812 to 1815, and again from 1826 to 1843 it was the usual seat of the legislature of the State; but it was not the legal capital until 1843. The town was at first called The Bluff, and later Nashburg, in honor of Gen. Francis Nash (*q. v.*); but it took the name of Nashville in 1784. After 1830 the city had a rather rapid growth, and in 1860 the census gave it a population of 16,988. In 1862 it was occupied by the Federal troops. In 1864 Gen. Hood's Confederate army was completely routed near the town by the forces under Gen. George H. Thomas. In 1870 the city had a population of 25,865; in 1880, 43,350.

NASMYTH, James, a British engineer and inventor, was born at Edinburgh, Aug. 19, 1808. He was the youngest son of Alexander Nasmyth, a landscape painter. He was early noted for his skill in handling tools, and by the sale of small steam-engines he obtained the means of studying natural science in the University of Edinburgh. In 1829 he became assistant to Henry Maudsley, the London engineer. In 1834 he commenced business for himself at Manchester, and here his works grew rapidly, so that he secured a new site, 4 miles off, for his Bridgewater foundry. Among his noted inventions are the steam-hammer, safety foundry ladle, suction-fan, reversible rolling-mill, spherical safety-valve, and a new form of steam-engine. In 1857 he retired from business and devoted himself chiefly to astronomy, with telescopes of his own manufacture. He contributed to T. Baker's *Elements of Mechanism* (1858); and published, with J. Carpenter, *The Moon, considered as a Planet, a World, and a Satellite* (1874). See his *Autobiography*, edited by S. Smiles (1883).

NAST, Thomas, an American caricaturist, was born at Landau, Bavaria, Sept. 29, 1840. In 1846 his parents emigrated to America, and at the age of fifteen he was employed on *Frank Leslie's Illustrated Newspaper*. He had received no regular instruction in drawing, yet his sketches were very acceptable. In 1860 he visited Europe, where he sketched for many periodicals and gave some attention to oil-painting. Returning to America he became connected with *Harper's Weekly*, to which he furnished a remarkable series of wood-cuts of an allegorical political nature. In his special line he is unsurpassed.

NASTURTIUM, a genus of plants, of the *cruciferæ* or mustard family, noted for their pungent taste and wholesome properties. *N. officinale*, the water-cress of Europe, now run wild in many parts of the United States, together with many other rapidly-growing foreign and native species, are used as salads. The water-cress has powerful anti-scorbutic properties. Another species, *N. Armoracia*, the horse-radish of Europe, now widely cultivated in America, is notable for its hot, biting taste and pungent odor. It is said not to seed in the United States. It is used as a table condiment, and also as a medicine. It acts as a stimulant to digestion, and increases the secretion of the kidneys. It has also been used in dropsy and chronic rheumatism. It yields a volatile oil, similar to that of mustard. The flowering garden nasturtium, *Tropæolum majus*, or Indian cress, belongs to a different order of plants. There are several beautiful varieties now cultivated. The unripe fruit is pickled and used by housekeepers as a substitute for capers.

NATCHEZ, a city of Mississippi, county-seat of Adams county, stands principally on a high bluff, on the E. bank of the Mississippi River, in 31° 34′ N. lat., 91° 22′ W. long., 275 miles above New Orleans. That part of the town which lies along the river is called "Natchez-under-the-Hill," the main city, or "Natchez-on-the-Hill," occupying the crest of the bluff. The city has a court-house, city-hall, several handsome churches, St. Mary's Roman Catholic Cathedral, a Masonic temple, public and parish schools for white and colored children, 2 orphan asylums, and a U. S. marine hospital. It is a terminus of the Natchez, Jackson, and Columbus Railroad. Natchez has large cotton-mills, and is the seat of a heavy trade in cotton. The French, under Bienville (*q. v.*), built a fort here in 1716. This fort was destroyed by the Natchez Indians, but was rebuilt in 1729. In 1763 it came into British occupation and was called Fort Panmure. The Spanish forces held the post from 1779 to 1798. Natchez was the capital of Mississippi Territory from 1798 to 1820. It was chartered as a city in 1803. Population in 1880, 7058.

NATCHEZ INDIANS. See Mound Builders.

NATIONAL DEBT. See Debt, National.

NATIONAL GUARD. See State Militia.

NATIVE AMERICAN PARTIES. There have been at all times more or less prevalent misgivings that our naturalization and election laws too liberally open the avenues of political power to alien-born citizens. Those inclined to the indulgence of an optimistic spirit make light of such fears, and it is generally admitted that, whatever may be our ideas of the abstractly desirable, nothing is to be gained by striving to reverse what has become a settled policy. Twice, however, within the last half century, there have been attempts to organize party action on the basis of voting only for native-born citizens. The "Native American party," in 1840–45, had a name to live, chiefly in the cities of New York and Philadelphia, but gained only local successes, the most marked of which was the election, in 1844, of James Harper as Mayor of New York city. Mr. Harper was then the senior member of the eminent publishing house of Harper & Brothers, and received the votes of many citizens, without distinction of party, who desired reform in city government. The defeat of the Whigs in the Presidential election of 1844 led to a temporary outbreak of Native American feeling, many of them being inclined to attribute their defeat to the vote of "adopted citizens." But the consummation of the Texas annexation scheme, the Mexican war, and the new issues which thereafter claimed recognition, were matters of far too real and pressing interest to permit the "Native" grievance to win serious attention, and the party disappeared.

In 1852 the Whig party nominated as its Presidential candidate Gen. Winfield Scott, whose brilliant success as a commander in two wars was a part of the national glory, but whose want of tact and of self-restraint made him a most unfortunate politician. The canvass was marked by a studied attempt to draw the Irish vote. The foolish frankness of the candidate and of some of his supporters, visited upon the party the humiliating sense of an unsuccessful suit, a tremendous defeat, and the half-consciousness of having deserved it. The Free Soil party also had suffered from large desertions, and was shrunken to half the strength it claimed four years before. At this crisis another Native American organization, the strongest and most extensive on record, "rose like an exhalation." The "American party" was organized as a secret order. Its members professed always to "know nothing" when questioned concerning it, and thus the order came to be popularly named the "Know Nothings." Their secret was so well kept that political leaders first became aware of what was going on when, in 1855, it appeared that the new and mysterious party had elected governors and legislatures in New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Kentucky, and California; had elected a part of the State officers in Maryland and Texas; and lost, by only a very small majority, the States of Texas, Louisiana, Mississippi, Alabama, and Virginia. In 1856 the party was organized for a national canvass, and nominated for President Millard Fillmore. The platform affirmed a number of political platitudes, but its distinctive principles were these: Americans must rule America, and to this end native-born citizens should be voted for in preference to foreign-born; no person should be selected for political station who acknowledges allegiance or obligation to any foreign prince, potentate, or power—in which description it is evident that the pope was meant to be included; and a change in the law of naturalization, requiring that the period of probation be extended to twenty-one years. Three elements were amalgamated in the party: sincere believers in its declared principles and tests; anti-slavery men who wished to use the order as a hammer to break up the Whig and to make a breach in the Democratic party; and a few politicians who had become *passé*, and hoped in the confusion to push again to the front. But the class of politicians was very slenderly represented. The party was almost without leaders. The legislature of Massachusetts, in 1855, was so largely made up of men without political experience that a clergyman was elected Speaker of the House of Representatives. The "American" movement reached the high-water mark of success in that year. In the national election of 1856 Mr. Fillmore, though supported also by what was left of the Whig party, received only the 8 electoral votes of Maryland, and a popular vote of 874,534, while the new Republican party carried all the Free States except Indiana, Illinois, Pennsylvania, New Jersey, and California, receiving 114 electoral votes and a popular vote of 1,341,234, and was fully recognized as the only real competitor of the Democratic party for the possession of the government. The American party vanished shortly from American politics and has had no successor or inheritor of its principles. (L. E. S.)

See Vol. I. p. 506 Am. ed. (p. 574 Edin. ed.).

NATURALIZATION. A person born in one country who makes a permanent residence in another country may under most of the existing governments become, if he desires, on certain conditions, a citizen of the land of his residence. The act by which an alien thus becomes a citizen of an adopted country is naturalization.

The right of an individual to change his allegiance has long been recognized by most civilized nations. Great Britain was almost alone in refusing up to the year 1870 to recognize this right. The earliest writers on international law, whose principles were generally adopted in the continental states of Europe, held it was free to every man to choose the state of which he would be a member, if his original sovereign did not prohibit or the interests of his native state did not render his presence necessary. In case of danger to his native country from war, or when a special prohibition is laid, the change of residence or allegiance might be held to be unlawful. The English law previous to 1870 held to the theory that no individual could change his allegiance. If he departed from his native country he still remained a citizen or subject of his native country. Individuals or persons belonging to certain classes, such as seamen or skilled workmen, were, however, by special acts of Parliament received into the state. The attempt on the part of Great Britain to enforce its principle, "once a British subject always a British subject," led before and during the war of 1812 to serious complications with the United States. Russia has also denied the right of expatriation to persons born subjects of its government.

The United States since the formation of the Union has recognized the right of free emigration and immigration, but did not formally recognize the right of self-expatriation until the passage of an act of Congress in 1868. Laws were framed providing for the naturalization of foreigners, but in several cases which reached the Supreme Court it was held that acts of naturalization by American citizens who had changed their residence did not absolve them from allegiance to their native country in the absence of permissive laws by the United States. In the case of the United States *vs.* Williams (2 *Cranch Sup. Court*, 82 n.), in 1799, Chief-Justice Ellsworth said, "Consent has been argued from the acts of our government permitting the naturalization of foreigners. When a foreigner presents himself here, . . . we grant him the privileges of a citizen. We do not inquire what his relation is to his own country. We have not the means of knowing, and the inquiry would be indelicate. We leave him to judge of that. If he embarrasses himself by contradictory obligations, the fault and folly are his own. But this implies no consent of the government that our own citizens shall expatriate themselves." Most of the other judicial opinions were in the same line, but Attorney-General Cushing, in 1856, in answer to inquiries from Mr. Marcy, the secretary of state, wrote an opinion in which he took the opposite ground. The act of 1868, the passage of which was probably brought about by the difficulties with the German and other governments about the status of naturalized citizens of this country resident abroad, and by the arrest of alleged Fenians in Ireland and Canada, declares that expatriation is a natural and inherent right of all people, and that "any declaration, instruction, opinion, order, or decision of an officer of this government, which denies, restricts, impairs, or questions the right of expatriation, is hereby declared inconsistent with the fundamental principles of this government." Whether the legal questions involved are or are not settled by this declaration of Congress, the privilege of changing allegiance by a citizen of this country is no longer practically questioned, and treaties with many countries recognize the right of expatriation.

Naturalization may be accomplished by an annexation of territory, and is then spoken of as collective naturalization. The inhabitants of the annexed lands then become citizens of the country which acquires the territory. When Louisiana was ceded to the United States by France in 1800, it was provided that the inhabitants of the ceded territory should be incorporated in the union of the United States and admitted as soon as possible, according to the principles of the Federal Constitution, to the enjoyment of all the rights, advantages, and immunities of citizens of the United States. The inhabitants of the Territory of Florida became citizens of the United States under a similar provision of the treaty with Spain in 1819. The joint resolution, passed March 1, 1845, for the annexation of Texas, provided for the admission of the Territory as a State of the Union, and its citizens became thereby citizens of the United States. The treaty with Mexico at the end of the Mexican war provided that Mexicans who remained in the Territories ceded to the United States might either retain the title and rights of Mexican citizens or could become citizens of the United States by remaining in the Territories, without declaring within one year their intention to remain Mexican citizens. Tribes or portions of tribes of Indians have also been naturalized collectively.

By far the greater part of the aliens who have become citizens of the United States have, however, done so as individuals under the naturalization laws passed by Congress. State laws were passed before the adoption of the Constitution of the United States, under which aliens were naturalized by several of the States. At the adoption of the Constitution, in 1787, and its subsequent ratification by the several States, the State laws were superseded by the laws passed in compliance with the power given to Congress by the Constitution, "to establish a uniform rule of naturalization." The first of these laws, that of March 26, 1790, provided that any alien, being a free white person, might become a citizen of the United States, after a residence in the country of two years and in his State of one year, by applying to a court of record and taking the oath of allegiance to the United States. It also provided that the children under 21 years of naturalized citizens should also be considered as citizens, and that the children of citizens of the United States born in foreign countries should be considered as citizens. The act of Jan. 29, 1795, provided for a preliminary declaration in the present form. By a law passed in 1798, and in force for only four years, a residence of 14 years, including 5 years after the making of a declaration of intention, was necessary before an alien could be admitted to citizenship. The basis of the present law is the act of April 14, 1802. The section relating to minor residents was passed in 1824. In 1870 the naturalization of persons of African descent was allowed, the law having previously applied only to free white aliens. The principal provisions now in force for the naturalization of aliens are contained in the following extracts from the United States Revised Statutes:

SEC. 2165. An alien may be admitted to become a citizen of the United States in the following manner and not otherwise:

First—He shall declare on oath, before a circuit or district court of the United States, or a district or supreme court of the Territories, or a court of record of any of the States having common law jurisdiction, and a seal and clerk, two years at least prior to his admission, that it is *bona fide* his intention to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince, potentate, state, or sovereignty, and, particularly, by name, to the prince, potentate, state, or sovereignty of which the alien may be at the time a citizen or subject.

Second—He shall, at the time of his application to be admitted, declare, on oath, before some one of the courts above specified, that he will support the Constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state, or sovereignty; and particularly, by name, to the prince, potentate, state, or sovereignty of which he was before a citizen or subject; which proceedings shall be recorded by the clerk of the court.

Third—It shall be made to appear to the satisfaction of the court admitting such alien that he has resided within the United States five years at least; and within the State or Territory where such court is at the time held, one year at least; and that during that time he has behaved as a man of a good moral character, attached to the principles of the Constitution of the United States, and well disposed to the good order and happiness of the same; but the oath of the applicant shall in no case be allowed to prove his residence.

Fourth—In case the alien applying to be admitted to citizenship has borne any hereditary title, or been of any of the orders of nobility in the kingdom or state from which he came, he shall, in addition to the above requisites, make an express renunciation of his title or order of nobility in the court to which his application is made, and his renunciation shall be recorded in the court.

SEC. 2166. Any alien of the age of twenty-one years and upward, who has enlisted, or may enlist, in the armies of the United States, either the regular or the volunteer forces, and has been, or may be hereafter, honorably discharged, shall be admitted to become a citizen of the United States, upon his petition, without any previous declaration of his intention to become such; and he shall not be required to prove more than one year's residence within the United States previous to his application to become such citizen; and the court admitting such alien shall, in addition to such proof of residence and good moral character, as now provided by law, be satisfied by competent proof of such persons having been honorably discharged from the service of the United States.

SEC. 2167. Any alien, being under the age of twenty-one years, who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of twenty-one years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen of the United States, without having made the declaration required in the first condition of section 2165; but such alien shall make the declaration required therein at the time of his admission; and shall further declare, on oath, and prove to the satisfaction of the court, that, for two years next preceding, it has been his *bona fide* intention to become a citizen of the United States; and he shall in all other respects comply with the laws in regard to naturalization.

SEC. 2169. The provisions of this title shall apply to aliens being free white persons, and to aliens of African nativity, and to persons of African descent.

SEC. 2170. No alien shall be admitted to become a citizen who has not for the continued term of five years next preceding his admission resided within the United States.

Other sections of the Revised Statutes provide that the widow and children of an alien who has declared his intention to become a citizen, but who dies before he is actually naturalized, shall be considered as citizens of the United States upon taking the required oaths. The children of naturalized aliens, being under 21 years of age at the time of the naturalization of their parents, become citizens by that act; and alien seamen who have served on a merchant vessel of the United States for three years after a declaration of their intention to become citizens, shall be deemed citizens. Provisions relating to the naturalization of aliens who resided in the United States before Jan. 29, 1795, or between June 15, 1798, and June 18, 1812, are practically obsolete. Alien enemies are not admitted to citizenship. Penalties are provided for the punishment of frauds in connection with the naturalization of aliens.

Decisions of U. S. courts under the naturalization laws have held the judgment of a court of competent jurisdiction; admitting an alien to citizenship is conclusive as to the performance of all necessary prerequisites. An interesting question has arisen as to the right of the Chinese to naturalization. Individuals of the Chinese race have been admitted in one or more of the States; but in 1878 Judge Sawyer, of the U. S. Circuit Court of California, held that under Section 2169 of the Revised Statutes only white persons and those of the African race could be admitted to citizenship. Mongolians, he says, have never been included in the definitions as members of the white or whitish race. Judge Deady, in the U. S. Circuit Court, District of Oregon, in 1880, went even further in deciding that a person whose father was a white man and whose mother was an Indian was not a "white person," and not entitled to naturalization. Mormons, who live in polygamy, have also been rejected when they applied for naturalization. Chief-Justice McKean, of the Utah Territorial Court, refused, as long ago as 1870 and 1871, to naturalize three avowed polygamists and two other Mormons who believed in but did not practise polygamy, on the ground that they were not men of "good moral character, attached to the principles of the Constitution of the United States, and well disposed to the good order and happiness of the same." Recent decisions in Utah have been to same effect. Persons convicted of other serious crimes have also been rejected when they applied for naturalization.

Frauds in naturalizing aliens have not been few when courts of record have been controlled by partisanship. In 1844 Judge Benjamin C. Elliott presided in the city court of Lafayette, Louisiana, and his proceedings in regard to the naturalization of aliens were such that a committee of the House of Representatives investigated them. The committee reported that Judge Elliott had unlawfully issued 1748 certificates of naturalization, and that he had been corruptly influenced by the use of money. He was removed from office on these charges. The committee in its report said: "Nearly 400 of these naturalization certificates were issued in one day. It seems to your committee impossible that this could have been legally done: 1200 oaths administered and 800 witnesses examined as to the age, the qualifications, the residence, and moral character of the different persons naturalized in open court by the judge."

Naturalization frauds of the most extensive character were practised in New York State, and especially in New York city, in 1868 and two years immediately preceding, when William M. Tweed was dominant in city politics. In 1866, when the workers at the fraudulent naturalization of aliens had not attained the great skill which they showed later, as many as 800 persons were naturalized in one day by Judge Cardozo, being double the number which in the case of the Louisiana court had been taken as almost presumptive evidence of fraud. The number of aliens naturalized in 1866 was more than 4000 more than had been naturalized in any preceding year, except those in which Presidential elections occurred. Similar frauds were perpetrated in naturalizing aliens in New York city in 1867; but it was not until the following year that the Tweed judges, some of whom were afterwards impeached or forced to resign, reached the height of their boldness in the perpetration of fraud. No inconsiderable number of fraudulent naturalizations occurred in New Jersey and Pennsylvania in the same year. As many as 720 aliens were naturalized in one day by the Pennsylvania Supreme Court in *Nisi Prius*, and a majority of the judges of the Supreme Court criticised the action of the *Nisi Prius* Judge as giving opportunity for fraud. Many arrests were made of persons charged with fraud in connection with these naturalizations in Philadelphia, and not a few fraudulent cases were found.

All of the previous frauds, however, or those committed in other States in the same year, become insignificant when the remarkable frauds in naturalization in 1868 in New York city are considered. Before that year, and since that time, the Supreme Court took no part in the naturalization of aliens. The Superior and Common Pleas Courts had done all the work of naturalization; but, in 1868, the Common Pleas Court not being under the control of the ring judges, it was thought that the Superior Court alone would not suffice to turn out all the required certificates of naturalization, and Judge George G. Barnard opened the Supreme Court for that purpose. The fact that, before the Supreme Court fairly got to work, 45,000 blank applications and 14,000 blank certificates of naturalization had been ordered and printed for the use of that court, when the whole number of aliens naturalized in all the courts in the city in any one previous year had only been a little over 16,000, would alone indicate that an unusual number of citizens were to be created. The methods of procedure adopted by Judge Barnard in the Supreme Court, and by Judge McCunn and others in the Superior Court, were such as to encourage fraud. There was practically no examination by the judges of the applicants and their witnesses. The men were brought in in crowds before the judges, who administered the oath to large numbers of persons at the same time, and with no apparent identification of the applicant by the witness. By sitting late in the evening, the judges managed in the two courts to have over 18,000 certificates issued in each of the two courts within 20 days. The whole number whose admission to citizenship is known to have been received in that year was 42,072, five times the average of former years, and more than twice the number naturalized in any previous year. The number of certificates issued was probably over 60,000. This result was accomplished by means which have since been fully made known, principally by the efforts of John I. Davenport, Esq., the U. S. Chief Supervisor of Elections in New York city. Fraudulent or "professional" witnesses were used in many of the cases where the applicants were not entitled to naturalization certificates. Patrick Goff, John Moran, and John Ward, three of these professional witnesses, were called on no less than 4658 times in 20 days to swear that they had known for 5 years persons whom they had never seen. One person would appear as witness for 300 to 400 applicants before the same judge on the same day. There were nearly 100 of these professional witnesses whose names continually occur on the records of these two courts. The papers themselves bear the most obvious marks of fraud. Frequently the whole series of affidavits, including signatures of the applicant and witness, are in the same handwriting, without even an attempt at disguise. Names, such as that of Patrick Goff, appear with different signatures, such as Goff or Gough, and sometimes by a mark, and at other times with the full signature. The perpetrators of these frauds were so indifferent to their own criminal acts as to frequently play grim jokes, signing even the name of William H. Vanderbilt as a witness, or that of August Belmont, who appears as using the X mark of the illiterate. Many of the persons who received naturalization certificates did not even go to the court to obtain them, but bought them for small sums of money from recognized naturalization bureaus. Others, who had been only a few months in the country, readily obtained certificates. Carl Kroeger, for instance, who landed on Sept. 10, 1868, obtained a certificate of naturalization within a month, and wrote joyfully to one of his companions, who had come to this country on the same vessel, but resided in another city, saying, "The purpose of this letter, written by an American citizen, is simply to ask that both you and Henry should come here as quickly as possible if you feel inclined to become citizens.'' Frauds of a like character, though on a smaller scale, were perpetrated in other counties of New York State in the same year.

The frauds were so notorious, in the naturalization of aliens, as well as in other respects, that Congress, in Dec., 1868, determined to investigate the subject, and a committee of the House of Representatives, under the chairmanship of Hon. William Lawrence, was appointed for that purpose. The committee, after many sessions, completed its labors, and reported to Congress in favor of the legislation now known as the National Election Law. No great frauds in naturalizing foreigners have occurred in the past few years.

The status of naturalized citizens of the United States, who have temporarily returned to their native countries, has been a subject of earnest dispute between the authorities of this and of other countries. Great difference of opinion has existed as to the obligation which a government assumes for the protection of an alien-born citizen, when he goes outside of the territorial limits of his adopted country. Where the naturalized citizen is employed on the merchant vessels of his adopted country, he is still, in the eyes of the law, in the territorial jurisdiction of the government to which he has taken allegiance, and the impressment by Great Britain of seamen on American vessels, who were alleged to be British subjects, was one of the chief causes of the war of 1812. Great Britain in that war claimed, though it never exercised, the right to execute as traitors persons born British subjects, who had become naturalized citizens of the United States and were found fighting against their native country. The state department, previous to 1859, had, on more than one occasion, refused to protect natives of Prussia or other countries, who returned to their native land after having been naturalized here, and who were then obliged to do military duty. The case of Simon Tousig, under the administration of Secretary Marcy, is to the point. Secretary Cass, however, in 1859, asserted a different principle, which has since become the uniform doctrine of American state authorities. Pres. Buchanan, in 1860, declared in a message to Congress, ''Our government is bound to protect our naturalized citizens everywhere.'' This doctrine, an innovation in 1859, has since become generally accepted, and has been ratified in numerous treaties. The case of Martin Kostza, an Austrian subject by birth, who had declared his intention to become a citizen of the United States, but who was arrested in 1853 outside of the Austrian dominions for complicity in a Hungarian insurrection, and who was released by threatening action on the part of Capt. Ingraham of the U. S. navy, is scarcely within the application of the principle adopted later.

The first formal acknowledgment by a European government of the doctrine adopted by the United States in regard to the status of naturalized citizens abroad, was embodied in the treaty with the North German Confederation, negotiated in 1868 by George Bancroft, the U. S. minister. It was agreed that citizens of either country naturalized in the other, after a residence of five years should be considered citizens of their adopted country, and should only be held liable for offences committed before emigration. Similar treaties followed within a few years with Great Britain, Belgium, Mexico, Denmark, Sweden, Norway, and several German and South American states. Great Britain, upon the passage of the English law of 1870, recognizing the right of expatriation and permitting the naturalization of foreigners under slight restrictions, made a formal treaty ratifying preliminary action that had been taken two years earlier in the line of the American doctrine. Russia—which does not recognize the right of expatriation, without special license—and Switzerland have been almost the only countries whose emigrants are frequently found in the United States, which have not formally agreed that the protection of a naturalized citizen by his adopted country can extend over the period of a temporary residence in his native land.

The proportion of naturalized citizens to those who are native-born is so large in some portions of the United States, that their relation to the conduct of public affairs is important. They virtually control the local elections in some parts of the city of New York. They are usually found to be as devoted as any part of the population to the principles of free government. Every official position known in the United States is open to the naturalized citizen, except those of President and Vice-President of the United States. Several members of the present Senate and many members of the House of Representatives are naturalized citizens.

The naturalization of aliens is for the most part performed by State courts, but as the applicants are admitted as U. S. citizens, the propriety of recognition by U. S. authority of each act of naturalization has frequently been suggested, and is advocated by chief supervisor John I. Davenport, of New York. This might be accomplished by the formation of a national bureau of naturalization, to which the clerks of all courts of record should be obliged to send copies of all orders admitting aliens to citizenship or lists of newly-made citizens. The evils which would thus be remedied are among the greatest which are found to exist under the present system. The probability of fraud by local courts would thus be greatly reduced, and the even more important result would be accomplished of preserving more completely the evidence of the admission of each foreign-born applicant to citizenship. The only record at present existing is that preserved in the naturalizing court. When, as has happened not infrequently, the court records are destroyed by fire or other accident, the naturalized citizen who has lost his certificate has no opportunity to renew the paper, which is the only conclusive proof of his admission to citizenship. The destruction of old Marine court records in New York city has alone caused great inconvenience and loss to many naturalized citizens.

There are few published works in this country that relate exclusively to naturalization, but all the standard treatises on international law consider the subject to some extent. Governor William Beach Lawrence, in the appendix to his edition of Wheaton's *International Law*, has a well-considered essay on "Naturalization and Expatriation." The *U. S. Diplomatic Correspondence for* 1867 contains a valuable essay by Mr. Yeaman, then the U. S. minister to Denmark, in which he reviews especially the arguments in favor of the American doctrine of non-interference with naturalized citizens who temporarily return to their native countries. The frauds in naturalization are graphically described by John I. Davenport in his *Election Frauds in the City of New York*. The French publications on private international law contain numerous discussions on the laws of naturalization in all civilized countries.

(J. P. D.)

NAUMANN, Emil, a German musician, was born at Berlin, Sept. 8, 1827. He studied music under Mendelssohn, and prepared first an oratorio *Christus der Friedenbote*, which was performed at Dresden in 1848. Having written an essay on the reform of church music, he was made director of the Berlin Cathedral choir. In 1873 he was made professor of the history and theory of music at Dresden. Among his musical works is a grand mass, performed at Berlin in 1852, and two operas *Judith* and *Mühlenhexe*. He has also published didactic and historical works, among which are *Tonkunst in der Culturgeschichte* (1869); *Deutsche Tondichter von Bach* (1876); *Italienische Tondichter von Palestrina* (1877); *Zukunftsmusik und die Musik der Zukunft* (1877); *Architectonik der Fuge* (1878).

NAUMANN, Johann Friedrich (1780–1857), a German ornithologist, was born at Ziebigk, near Köthen, Feb. 14, 1780. He was educated at Dessau, and devoted himself to natural science. The duke of Anhalt-Köthen appointed him keeper of the ornithological museum. His chief publication, *Naturgeschichte der Vögel Deutschlands* (2 vols., 1842–44), is a standard work of its class.

NAUMANN, Karl Friedrich (1797–1873), a German mineralogist, was born at Dresden, May 30, 1797. He studied geology at Freiberg, under Werner, and afterwards at Leipsic and Jena. In 1821 he made a scientific journey to Norway, which furnished material for his *Beiträge zur Kenntniss Norwegens* (2 vols., 1824). He became professor extraordinary at Jena in 1823, and in 1826 was made professor of crystallography, and inspector of studies at Freiberg. In 1835 he was made professor of geognosy, and in 1842 he was called to the same chair at Leipsic. He died at Dresden, Nov. 26, 1873. Naumann was the highest authority on mineralogy and crystallography in his time. His excellent system of classifying crystals was still further improved by W. H. Miller (*q. v.*). Among his publications are *Lehrbuch der Mineralogie* (1828); *Lehrbuch der reinen und angewandten Krystallographie* (2 vols., 1830); *Anfangsgründe der Krystallographie* (2d ed., 1854); *Elemente der Mineralogie* (1846; 4th ed., 1854); *Lehrbuch der Geognosie* (1850; 2d ed., 1854).

NAVAJO, or Navaho, Indians, a tribe of American aborigines, belonging to the Tinney or Athabascan stock. Together with their kindred, the Apaches, they form the extreme southern and locally aberrant detachment of that great family. Their own name for themselves is Yutahenne. They have a fine reservation in Arizona and New Mexico. Physically they are strong and well built, and they are expert horsemen. They have a special interest on account of their very considerable degree of native civilization; but this may have been acquired from the Pueblo Indians. Indeed no other tribe of the Tinney family approaches the same degree of culture.

While not of highly aggressive disposition, the Navajos have always shown much spirit in defending their rights. The Mexicans often assailed them in vain. After the United States had acquired their country from Mexico the Navajos were often complained of as being guilty of plundering the trappers and killing white adventurers, although a part of the tribe was always friendly. No less than six military expeditions against them were fruitless; and they showed no regard for the numerous treaties which they seemed willing enough to make, but which they did not fully understand. In 1863, during the civil war, Col. Kit Carson punished them severely, and took some 7000 of them prisoners. For 5 years they were maintained at government expense on a reservation; but during this time they were discontented and sickly. This experience cured them of the love of war. In 1869 they were returned to their old home, where they soon became prosperous, and in 1883 they were entirely self-supporting. The number on the reservation in 1872 was 9114; in 1882 it was about 17,000, a large part of the increase being due to the return of outlying bands. From the first a good part of the tribe has lived in fixed towns or villages; but the houses, or "hogans," are mostly rude booths made of sticks, sods, and bushes. The Navajos will never enter a house where any one has died; consequently, they prefer the "hogan" to a more expensive abode. When a person dies the prop-sticks of the hut are pulled out, the sticks and sods fall in, and the corpse receives no further interment. From a very early date the Navajos have kept horses, cows, sheep, and goats, and they still have great skill as herders. The women spin and weave wool and cotton, and sell many excellent blankets to the whites. The people are in general decently and warmly clad in homespun garments. They have cornfields and vineyards, and live largely upon the flesh of their herds and flocks, but they also gather the nuts of the pine (piñon) for food. Nevertheless the aged, infirm, and improvident suffer much in very dry or frosty seasons, unless relieved by government aid. Irrigation of the land is practised to some extent. Their reserve includes 5,468,160 acres of land, of which some 15,000 acres are tillable, and nearly all this available land is under actual culture. Most of the farming is done with hoes and sharp sticks. Maize, beans, melons, pumpkins, and wheat are the leading crops. They have 40,000 horses, 500 mules, 1200 neat cattle, and 1,100,000 sheep and goats, beside many burros or asses. In the famous Cañon de Chelle they have extensive and valuable orchards of peaches and apricots. There is a school on their reservation, but the people, as a rule, will not send their children to school. Considerable lumber is cut and sawed by the Indians, who also work brass and silver by native methods with some skill. Polygamy is very general. Few of the people have individual or personal names. The Navajos are not strict communists; they respect each other's property, but the more prosperous ones gladly share their crops with those who are less fortunate. Crime is very rare, except among those who drink whiskey. Some of the women are unchaste, but such lose caste with the tribe. Gambling is very common. The tribe has an elaborate religious ritual, best known to the priests and medicine-men, and for the most part carefully concealed from white people. (c. w. g.)

NAVARRETE, Martino Fernandez de (1765–1844), a Spanish historian, was born at Abalos, Spain, Nov. 9, 1765. He entered the Spanish navy at the age of 15, and took part in the attack on Gibraltar in 1782. He fought against the Barbary pirates and against the French in the Mediterranean. Being appointed to an office in the ministry of marine he made extensive investigations of Spanish maritime discoveries in the fifteenth century. The results were shown in his *Coleccion de los Viajes y Descubrimientos que hicieron por mar los Españoles desde fines del Siglo XV.* (5 vols., 1825–37), from which Washington Irving drew his account of the voyages of Columbus. Navarrete also published accounts of the Spanish discoveries on the Pacific coast of America, and a *Life of Cervantes* (1819). After his death appeared his treatise on the *History of Spanish Navigation* (1846), and the *Spanish Maritime Library* (1851). The publication of valuable documents illustrating the history of Spain was projected by him and he edited several volumes. He died at Madrid, Oct. 8, 1844.

NAVAL ACADEMY, U. S. This academy was founded in 1845 by the Hon. George Bancroft, Secretary of the Navy. It was formally opened Oct. 10 of that year, under the name of the Naval School, with Commander Franklin Buchanan as superintendent. It was located at Annapolis, Md., on the land occupied by Fort Severn, which was given up by the War Department for that purpose. The course was fixed at five years, of which only the first and last were spent at the school, the intervening three being passed at sea. This arrangement was not strictly adhered to, the exigencies of the service making it necessary in many cases to shorten the period of study. In January, 1846, four months after the opening of the school, the students consisted of 36 midshipmen of the date of 1840, who were preparing for the examination for promotion; 13 of the date of 1841, who were to remain until drafted for service at sea, and 7 acting midshipmen appointed since September of the previous year. The midshipmen of the date of 1840 were the first to be graduated, finishing their limited course in July, 1846. In September, 1849, a board was appointed to revise the plan and regulations of the Naval School. The board was composed of the following officers: Commander Wm. B. Shubrick, Commander Franklin Buchanan, Commander Samuel F. Du Pont, Commander George P. Upshur, Surg. W. S. W. Ruschenberger, Prof. Wm. Chauvenet, Capt. Henry Brewerton, U. S. A. The plan reported by the board was approved and went into operation July 1, 1850.

The new organization provided for a course of seven years, first two and last two at the school, and the three intermediate years at sea. The school was placed under the supervision of the Bureau of Ordnance and Hydrography, and its name was changed to the United States Naval Academy. The corps of professors was enlarged, the course extended, and the system of separate departments, with executive heads, was fully adopted. It was provided that a board of visitors should make an annual inspection of the academy, and report upon its condition to the secretary of the navy. A suitable vessel was attached to the academy as a practice ship and the annual practice cruises were begun.

After the system had been in operation a year new changes were proposed and the recommendations of the academic board were referred to the board of examiners of the year 1851. The change recommended by the board of examiners and adopted by the department consisted mainly in leaving out the requirements of three years' sea service in the middle of the course, thus making the four years of study consecutive. The practice cruise supplied the place of the omitted sea service and gave better opportunities of training. This change went into operation in November, 1851, together with other improvements suggested by the board, and has continued with some slight modifications till the present time. The first class to receive the benefit of it was that which entered in 1851. Six members of this class completed the course in three years, and were graduated in June, 1854; the rest of the class followed in 1855.

In May, 1861, on the outbreak of the civil war, the academy was removed to Newport, R. I. The three upper classes were detached and sent to sea and the remaining acting midshipmen were quartered in the Atlantic House and on board the frigates Constitution and Santee. In September, 1865, the academy was moved back to Annapolis, where it has since remained.

When the Bureau of Navigation was established, July 5, 1862, the academy was placed under its supervision. March 1, 1867, it was placed under the direct care and supervision of the Navy Department, the administrative routine and financial management being still conducted through the bureau. On March 11, 1869, all official connection with the bureau came to an end.

The term of the academic course was changed by law, March 3, 1873, from four to six years. The change took effect with the class which entered in the following summer.

In 1866 a class of acting third assistant engineers was ordered to the academy for instruction. The course embraced the subjects of steam-engineering, mechanism, chemistry, and mechanics, and practical exercises with the steam-engine and in the machine-shop. This class was graduated in June, 1868, together with two cadet engineers who had entered the academy in 1867. After an interval of four years, in October, 1871, a new class of cadet engineers was admitted. This class followed a two years' course, somewhat more extended than that of the class of 1868, and was graduated in 1873. In 1872 and 1873 new classes were admitted, the first of which left the academy in 1874 and the second in 1875. By an act of Congress, approved Feb. 24, 1874, the course of instruction for cadet engineers was made four years instead of two, and the new provision was first applied to the class entering the academy in the year 1874. This class was graduated in June, 1878.

By an act of Congress, approved Aug. 5, 1882, it was provided that from that date "there shall be no more appointments of cadet-midshipmen or cadet-engineers at the Naval Academy, but in lieu thereof naval cadets shall be appointed from each congressional district and at large as now provided by law for cadet-midshipmen, and all the undergraduates at the Naval Academy shall thereafter be designated and called naval cadets, and from those who successfully complete the six years' course appointments shall thereafter be made as it is necessary to fill vacancies in the lower grades of the line and engineer corps of the navy and the marine corps. *And provided further*, That no greater number of appointments into these grades shall be made each year than shall equal the number of vacancies which have occurred in the same grades during the preceding year, such appointments to be made from the graduates of the year at the conclusion of their six years' course, in the order of merit as determined by the academic board of the Naval Academy; the assignment to the various corps to be made by the secretary of the navy upon the recommendation of the academic board. But nothing herein contained shall reduce the number of appointments from such graduates below ten in each year, nor deprive of such appointment any graduate who may complete the six years' course during the year 1882. And if there be a surplus of graduates, those who do not receive such appointment shall be given a certificate of graduation, an honorable discharge, and one year's sea pay, as now provided by law for cadet-midshipmen; and so much of section 1521 of the revised statutes as is inconsistent herewith is hereby repealed."

"That any cadet whose position in his class entitles him to be retained in the service may, upon his own application, be honorably discharged at the end of four years' course at the Naval Academy, with a proper certificate of graduation."

Entrance.—"There shall be allowed at said academy one naval cadet for every member or delegate of the House of Representatives, one for he District of Columbia, and ten at large." (*Rev. Stat.*, § 1513.)

"The secretary of the navy shall, as soon after the 5th of March in each year as possible, notify, in writing, each member and delegate of the House of Representatives of any vacancy that may exist in his district. The nomination of a candidate to fill said vacancy shall be made upon the recommendation of the member or delegate, if such recommendation is made by the first day of July of that year; but if it is not made by that time the secretary of the navy shall fill the vacancy. The candidate allowed for the District of Columbia and the ten at large shall be selected by the President." (*Rev. Stat* § 1514.)

"Candidates allowed for congressional districts, for Territories, and for the District of Columbia must be actual residents of the districts or Territories, respectively, from which they are nominated. And all candidates must at the time of their examination for admission be between the ages of fourteen and eighteen years and physically sound, well formed, and of a robust constitution." (*Rev. Stat.*, § 1517.)

"All candidates for admission into the academy shall be examined according to such regulations and at such stated times as the secretary of the navy may prescribe. Candidates rejected at such examinations shall not have the privilege of another examination for admission to the same class unless recommended by the board of examiners." (*Rev. Stat.*, § 1515.)

"When any candidate who has been nominated upon the recommendation of a member or delegate of the House of Representatives is found upon examination to be physically or mentally disqualified for admission the member or delegate shall be notified to recommend another candidate, who shall be examined according to provisions of the preceding section." (*Rev. Stat.*, § 1516.)

Candidates are examined physically by a board of three medical officers of the navy. They must have sound physical and mental constitution and full use of their senses. Each candidate must certify on honor as to his exact age. No one manifestly under size for his age is received at the academy. In the case of doubt about the physical condition of the candidate any marked deviation from the usual standard of height or weight adds materially to the consideration for rejection. The minimum height allowed for the candidate is five feet, but this can be waived for very young candidates by the secretary of the navy.

Candidates are examined mentally by the academic board in reading, writing, spelling, arithmetic, geography, English grammar, history, and algebra. All the examinations, except in reading, are written. Deficiency in any of these subjects is sufficient to insure the rejection of a candidate, but plenty of time is given, and any boy with a good common-school education and of average intelligence should be able to pass; 62.5 per cent. of the maximum marks obtainable in each subject being regarded as satisfactory.

Candidates who pass the physical and mental examinations receive appointments as naval cadets, and become inmates of the naval academy. Each cadet must sign articles binding himself to serve in the U. S. navy eight years (including his time of probation at the naval academy), unless sooner discharged. A naval cadet is paid $500 a year, commencing at the date of his admission.

Cadets, immediately after their admission, are required to supply themselves with an outfit of clothing and other articles, whose value is estimated at $187.68. Most of the articles must conform to the regulations, and must, therefore, be supplied by the storekeeper. Each cadet must deposit with the paymaster the sum of $20, for which he will be credited on the books of that officer, to be expended, by direction of the superintendent, in the purchase of text-books. The total deposit required before the candidate can be received into the academy is therefore $207.68. The value of clothing brought from home is deducted from this amount. Each cadet, *one month after admission*, is credited with the amount of his actual expenses in travelling from his home to the academy; but if he *voluntarily* resign his appointment within a year of the time of his admission to the academy, the amount paid for travelling expenses must be refunded.

Organization.—A line officer, of a rank not below that of captain, is assigned by the secretary of the navy as superintendent of the Naval Academy, who is charged with the general superintendence and government of the academy, and all officers, professors, instructors, and cadets are under his command.

The following is a list of the superintendents of the academy since its foundation, with the date at which each assumed command:

Commander Franklin Buchanan	September 3, 1845.
Commander George P. Upshur	March 15, 1847.
Commander Cornelius K. Strubling	July 1, 1850.
Commander Louis M. Goldsborough	November 1, 1853.
Captain George S. Blake	September 15, 1857.
Rear-Admiral David D. Porter	September 9, 1865.
Commodore John L. Worden	December 1, 1869.
Rear-Admiral C. R. P. Rodgers	September 22, 1874.
Commodore Foxhall A. Parker	July 1, 1878.
Rear-Admiral George B. Balch	August 2, 1879.
Rear-Admiral C. R. P. Rodgers	June 13, 1881.
Captain F. M. Ramsay	November 14, 1881.

Next to the superintendent is the commandant of cadets, who is a line officer not below the grade of commander. He has charge and supervision, under the orders of the superintendent, of the police and police force of the academy, including watchmen and marines, also general direction of all drills and tactical studies, looks out for the discipline of the cadets, keeps a record of their conduct, and calls the attention of the superintendent to anything that would conduce to their comfort or enjoyment. Cadets wishing to address the superintendent officially must first obtain his permission, and cadets having business with the commandant must apply to the officer in charge for permission to visit his office.

The academic board is composed of the superintendent, the commandant of cadets, and the heads of departments. The board's duty is to prescribe, subject to the approval of the secretary of the navy, the subjects and arrangement of the course of instruction, and the text-books to be used; to regulate the recurrence of examinations; to determine the relative weight of marks for recitations and examinations in any department, on the recommendation of the head of the department; to fix the relative weight of marks in different branches; to submit regulations governing the examination for admission; to make semi-annual and annual reports of the relative standing of cadets, and of the marks, aptitude, habits, and conduct of cadets found deficient, with recommendations as to the disposal of the latter.

Officers are ordered to the Naval Academy by the secretary of the navy, and are assigned to such duty as the superintendent sees fit. Those officers who are attached to departments perform the duties of instructors. The departments are as follows:

Seamanship, naval tactics, and naval construction; ordnance and gunnery; astronomy, navigation, and surveying; steam-engineering; mechanics and applied mathematics; physics and chemistry; mathematics; English studies, history and law; modern languages; mechanical drawing.

The senior medical officer is directly responsible to the superintendent for the care of the sick, the suggestion of measures for the maintenance of a proper hygiene, and the preservation and expenditure of public property belonging to his department. He reports the names of all cadets who are unfitted for duty by illness, and also any person feigning illness or disability.

An officer of the pay corps is assigned to duty as treasurer of the academy, who keeps the accounts of the cadets, pays their bills, and pays to the cadets such small sums of money as the superintendent may authorize. Sixty dollars per annum of each cadet's pay is reserved for the purchase of his outfit at graduation.

The storekeeper, also an officer of the pay corps, procures clothing and other necessaries for the cadets, which are issued upon the written authority of the superintendent or commandant of cadets. Cadets who need such articles as the storekeeper is authorized to furnish, enter the articles in their requisition books, which are issued once a month, with prices opposite. The books are all sent to the commandant of cadets, who approves or disapproves the requisition. If approved, the books are sent to the store, where the cadets are permitted to go at certain times to draw the articles they have required.

The commissary of the naval academy, under instructions from the superintendent, fixes the dietary of the mess-hall; is charged with the purchase and care, until issued for use, of all articles of provision, table-ware, table-linen, kitchen-ware, and stores in general, needed for the complete ordering of the cadets' table and laundry; and he is responsible for the proper preparation and cooking of all articles of table consumption.

The cadets are arranged in four classes, corresponding to the four years of instruction. Cadets pursuing the first year's course form the fourth class; the second year's course, the third class; the third year's course, the second class; the fourth year's course, the first class.

Study.—The course of instruction extends over four years, the course of each year being as follows:

First Year—Fourth Class.—Algebra, geometry, English studies, ancient, naval, and U. S. History, French, and Spanish (given as an advanced course).

Second Year—Third Class.—Descriptive geometry, trigonometry, English studies, contemporary history, law (Constitution of the United States), analytical geometry, physics, chemistry, mechanical drawing, French and Spanish (advanced course).

Third Year—Second Class.—Marine engines and boilers, sound, heat, and light, differential calculus, integral calculus, mechanical drawing, electricity and magnetism, kinematics, dynamics, kinetics, hydrodynamics, and international law.

Fourth Year—First Class.—Naval construction, seamanship, naval tactics, ordnance and ordnance instructions, infantry tactics, gunnery, theory and practice of navigation, astronomy, deviation of the compass, surveying, method of least-squares, applied mechanics.

Each class under instruction in a certain department is arranged by the head of that department in sections, with about a dozen in each section. The cadet whose name stands first on the list of a section is the "leader," and the next one the "second leader." The leader must have a list of his section, and report all irregularities in dress and conduct. The period of recitation under a department covers two hours, one-half the class going the first hour, and the other half the second hour. Cadets inform themselves in regard to the hours at which they recite under the various departments, and enter the times on a "time-table," which is pasted on the inside of the door of their room. The call for studies is by a bugle; all cadets who recite at that time, assemble and fall in at the order of the officer-of-the-day. The section-leaders call the roll of the sections and report absentees. They then march their sections into the section-rooms, preserving strict military discipline and silence. The leader gives the order "seats," and reports absentees to the instructor. The instructor then proceeds to hear the recitations, sending some cadets to the blackboard to write on certain subjects, and calling on others to recite without going to the board. Cadets reciting stand at parade rest. The scale of marks for recitations ranges from 4 to 0. A mark of 4 indicates thoroughness; 0, a total failure; and intermediate numbers, as far as possible, represent absolute values. Any cadet absent without authority, or who receives unauthorized assistance, written, printed, or oral, or has any written or printed matter in possession relating to the subject of the recitation, shall be given a zero as his mark. Receiving or making use of unauthorized assistance is known as "gouging" by the cadets, and is severely punished. When the cadets are dismissed by the instructor at the end of the recitation, the leader gives the orders, "rise" and "march out," forms his section and marches them to the place designated for its dismissal and breaks ranks. There are three periods of two hours each, two in the morning and one in the afternoon, during which cadets recite; these are known as "study hours," during which cadets must stay in their rooms, unless it is their turn to recite, or they receive permission to go out. There are also "study hours" in the evenings from 7.30 till 9.30. The daily recitations averaged for the week give the weekly mark, and the weekly marks are averaged and combined with the monthly examination, if there be one, giving the monthly mark. The academic year is divided into two terms. The monthly marks are averaged for the first term, and combined with the mark on the examination, the monthly average having a greater weight than the examination mark, and so the mark for the first term is obtained. The same is done during the second term, and the average of the two term-marks gives the final mark for the year. The final marks in each study are kept separate. Different branches of study have different weights, according to their professional importance. Thus, in the fourth year, astronomy, navigation, and surveying have a weight of 20; mechanics and applied mathematics, 5; ordnance and gunnery, 20; ship-building; 6; seamanship and naval tactics, 18; practical instruction in steam, 2; conduct, 5. Merit rolls are made out annually showing the proficiency of the cadets in each branch of study. Each branch, as stated above, has a certain weight represented by a coefficient, the final mark in each branch (on a scale of 4) being multiplied by this coefficient. The sum of the products is the *final mark* of the cadet for the year, and determines his standing in his class. The deduction from the mark for conduct is 0.013 for each demerit in the fourth class; 0.032 in the third class; 0.06 in the second class, and 0.133 in the first class. The final standing for the course is determined by the sum of the yearly marks. It will be seen that this is a very perfect system, as every recitation, examination, or irregularity in conduct has its influence on the final standing. Cadets attaining 85 per cent. of the multiple in any year are distinguished by a star affixed to their names on the merit rolls, and are permitted to wear a gold embroidered star on the collar of their full-dress coats.

Advanced courses in particular branches of study are established for cadets showing marked ability and aptitude in such studies; the final mark in the branch of study being determined by adding to the final mark received in the required course one-fifth of the amount by which the final mark in the advanced course exceeds 2.50.

A mark of 2.5 (62.5 per cent.) represents the minimum of proficiency, and cadets whose average for the term or year in any branch falls below that mark are reported to the academic board as deficient in that branch. Cadets found deficient are not continued in the service or at the academy, except upon the recommendation of the academic board.

The diplomas of cadets whose final marks on the graduating rolls are not less than 85 per cent. of the maximum read "passed with distinction;" those whose final marks are between 74 and 85 per cent. of the maximum read "passed with credit;" and those whose final marks are between 62½ and 74 per cent. of the maximum read "passed."

Recitations finish at 4 P. M., and at 4.05 the cadets are called to drill.

Practical Instructions and Drill Under the Department of Seamanship and Naval Tactics.—Knotting and splicing; compass and lead line; ship nomenclature; cutting and fitting hemp and wire rigging; rowing and the management of boats under oars and under sails; sail-making; making up, bending, unbending, and handling sails; rigging ship; stripping ship; shifting spars; getting under way and anchoring, evolutions with vessels under steam and under sail; signalling, Myers and navy codes; management of steam-launches, steam-fleet tactics (with steam-launches); boxing, swimming, and gymnastics.

Department of Ordnance and Gunnery.—School of the soldier, company, and battalion (infantry); skirmish drill, school of the battery; school of the battalion (artillery); exercises with broadside, pivot, and monitor guns, mortars, boat howitzers, and machine guns; target practice with small-arms and mortars; target practice afloat with machine guns, rifled howitzers, and great guns, small-sword exercises; handling and firing torpedoes; determination of the strength and elasticity of gun-metal with testing machine; determination of muzzle velocities with Schultz chronoscope; determination of pressures in guns by means of pressure gauges; experimental determination of range tables, also of the jump and drift; application of photography to ordnance purposes; the preparation and inspection of ordnance material; dancing.

Department of Astronomy, Navigation, and Surveying.—Practical navigation; surveying and constructing a chart of a portion of the Severn River; swinging an iron ship and observing the deviations and times of vibration of horizontal and vertical needles on different courses; and from these observations finding the approximate and exact coefficients and the horizontal and vertical forces acting on the standard and steering compasses; also finding the heeling coefficients for the same compasses without heeling the ship.

Department of Steam-Engineering.—Vise bench work; forging; boiler-making; pattern-making; machine tool work; taking apart and putting together engines; running engines of launches, vessels, and monitors (motive and turret).

Daily Routine.—From Oct. 1 to Nov. 3, and from March 20 to the close of the academic year:

On week days.

Morning gun fire and reveille	6.00 A. M.
Morning roll call and prayers	6.45 “
Breakfast	7.00 “
Sick call	7.30 “
Morning call to studies	7.56 “
Recitations	8.26 A. M. to 12.45 P. M.
Dinner	1.10 “
Recitations	2.00 to 3.56 “
Call to drill	4.05 “
Recall	5.15 “
Evening roll call and parade:	
Sept. 20 to Oct. 20	Before supper.
April 20 to the end of the year	6.30 P. M.
Oct. 20 to Nov. 10, and March 20 to April 20	6.00 “
Exercises in gymnasium	15 minutes after supper.
Evening studies (as directed by the superintendent)	7.30 or 8.00 P. M.
Gun fire and tattoo	9.30 “
Taps	10.00 “
Saturday forenoon drill	10.35 A. M.

From November 20 to March 20, the following changes are made in the routine:

Morning gun fire and reveille	6.15 A. M.
Morning roll call and prayers	7.00 "
Breakfast	7.15 "
Sick call	7.45 "
Evening roll call and parade before supper	5.30 P. M.

On Sunday throughout the year:

Morning gun fire and reveille	6.30 or 6.45 A. M.
Morning roll call and prayers	7.15 or 7.30 "
Breakfast	7.30 or 7.45 "
Sick call	8.00 or 8.15 "
Church (first Sunday in the month)	10.26 "
Church call (other Sundays)	10.40 "
Dinner formation	12.55 P. M.
Evening roll call and parade before supper.	5.30 or 6.00 "
Call to evening studies	7.30 or 8.00 "
Gun fire and tattoo	9.30 "
Taps	10.00 "

Cadets must rise promptly at gun fire, make up their beds, and leave their rooms in perfect order. Two cadets are quartered in each room, which are very plainly furnished. At breakfast formation the battalion of cadets is inspected by the officer in charge. Every cadet must be neat and dressed according to regulations. The conduct report of the day before, a list of all violators of the regulations, is read at breakfast formation. After breakfast the chaplain reads a short selection from the Bible and gives a short prayer, after which the battalion is marched out.

One of the officers on duty at the Naval Academy is detailed as officer-of-the-day, who has similar duties and responsibility with the executive officer on board ship, enforcing all regulations and making inspections of the quarters whenever he may think it necessary.

Two cadets of the first class are detailed each day to act as officers-of-the-day, who are excused from drills and recitations during their tour of duty. The officer-of-the-day receives and treats with courtesy all visitors, enforces regulations, attends roll calls and mess formations, and writes up the journal. He copies the daily conduct report during the evening so that it may be read in the morning.

Cadets are also detailed as superintendents of floors and buildings each day. They enforce the regulations and keep order in the rooms under their charge. They inspect the rooms after "taps" and see that all cadets are in bed. They must not talk with other cadets and must not allow them to loiter around the superintendent's desk.

Divine Service.—The services of the Protestant Episcopal Church are held in the chapel of the academy. Permission to attend other churches in the city can be got by writing to the parent or guardian. On the first Sunday of the month the articles for the better government of the navy are read, all officers and all cadets being present; after they are read, church parties for services in the town fall in on the outside and march to their respective churches.

Cadet Organization.—Cadets are arranged in gun crews of about 16 men, distributed as nearly as possible among the several classes. Three or four gun crews constitute a division, each division constituting a battery for light artillery drill and a company for infantry drill. Each division has a cadet lieutenant in command, with a cadet master and cadet ensign second and third in command. There is a cadet ensign who acts as adjutant of the battalion, and a cadet lieutenant-commander who acts as lieutenant-colonel in the battalion organization, and bears the same relation to the cadet organization that an executive officer bears to a ship's company, taking charge of all formations and reading orders to the battalion. Captains of gun crews muster their men at roll calls and report them to the cadet lieutenants of divisions, who in turn report to the cadet lieutenant-commander. Cadet officers are distinguished by special badges of rank prescribed by the superintendent.

Cadets who have not over a certain number of demerits are permitted to go out into the town Saturday afternoons. The establishment of conduct grades, regulated by the number of demerits received, has worked much good, as cadets find that the privileges are so wisely planned that the pleasures due to them in the upper grades far outweigh that charm which breaking regulations gives to youth.

No punishment except the following can be inflicted, unless by the order of the secretary of the navy: solitary confinement not exceeding seven days; coventry; public reprimand on parade by written orders signed by the superintendent; confinement under guard; confinement in quarters; deprivation of leave; deprivation of recreation; extra watch or guard duty and drill; imposition of extra duties; suspension; reduction of cadet rank. Removal from the service can only be authorized by the secretary of the navy.

There are so many offences in the demerit book, from "hands in pockets" to "going beyond the academic limits without permission" or "Frenching," that strangers are surprised that the cadets can ever escape them; but they have only to get into the routine and it is an easy matter not to be reported or "spotted," as the cadets call it. The number of demerits allowed is 150 for the first class, 200 for the second class, 250 for the third class, and 300 for the fourth class. At the end of each term a report of the number of demerits of each cadet, together with his marks and standing in each completed branch, is sent to the parent or guardian.

Hazing.—"In all cases when it shall come to the knowledge of the superintendent of the Naval Academy, at Annapolis, that any naval cadet has been guilty of the offence commonly known as hazing, it shall be the duty of said superintendent to order a court-martial, composed of not less than three commissioned officers, who shall minutely examine into all the facts and circumstances of the case and make a finding thereon; and any naval cadet found guilty of said offence by said court shall, upon recommendation of said court, be dismissed; and such finding, when approved by said superintendent, shall be final; and the cadet so dismissed from said Naval Academy shall be forever ineligible to reappointment to said Naval Academy" (23 *June*, 1874, *v.* 18, *p.* 203).

Every year sensational stories are seen in the public press in regard to hazing at the Naval Academy, which, as a rule, have not the slightest foundation. Many candidates account for their failures to pass the entrance examinations by stories of ill treatment that in the minds of sympathizing relatives seem horrible indeed. As a matter of fact hazing is far from being an unmixed evil. Youngsters come from all parts of the country, many with an exaggerated sense of their own importance, due to their selection over other competitors, and in many cases they are in a condition best expressed by "spoilt." They have to at once settle down to military discipline, and a little talking to by the older cadets helps them along amazingly. Hazing rarely goes beyond badgering, though sometimes youngsters are made to climb a wardrobe or sing a song; but nowadays they are never hurt, though some years ago injuries were known to result from hazing. An amusing instance, and one showing how hazing worked good instead of evil, is the case of a class which entered a few years ago, whose members on entry did not carry themselves well. The class next above them noticed this, and they were made at all times to walk about with their arms down and heads thrown back. The result was that they acquired an erect military bearing in a very short time. Many of the youngsters enter into the spirit of the hazing and enjoy it as much as those who are hazing them, and instances are often seen where the upper classman makes himself most ridiculous and really becomes the hazed instead of the hazer. Hazing is against the regulations, and so should be punished; for if there were not some check, it might go too far. But in general the upper classmen never disturb a man whom they find to be unsatisfactory in study, but they are always ready to help him if asked.

Amusements.—The Naval Academy balls are well-known social features, and are great favorites with all the young ladies, who find them a safe place to indulge in desperate flirtations, insomuch as one of the regulations of the academy is that "any cadet who shall marry, or who shall be found to be married, shall be dismissed the service." Hops are held nearly every Saturday night from 7.30 till 10 P. M., but the large balls are held till a much later hour. The principal balls are the annual ball, in January, given by the first class, and the June ball, given to the graduating class. Boat clubs and base-ball clubs are formed and athletic tournaments and theatrical performances are given by the cadets. Those in the upper conduct grade can visit their friends in town and escort ladies to and from the hops. In the morning and afternoon the band plays in the grounds, and after drill in the afternoon cadets can walk around with their friends who happen to be in the yard.

Practice Cruises.—At the end of the academic year the first and third and such of the fourth class as have entered are embarked on the practice ship and sent to sea, where they are taught seamanship and navigation. The second class is now kept on the Santee for machine-shop and other practical instruction. The ships return to the academy in time to give all the cadets leave during the month of September.

(L. N.)

See Vol. XVII. p. 257 Am. ed. (p. 250 Edin. ed.).

NAVIGATION. The ancient policy of Great Britain seems to have afforded little or no protection to shipping by means of exclusive privileges. Henry VII., in 1485, prohibited the importation of certain wines in any except English vessels. This was the germ of the protective navigation laws of England. A series of legislative enactments, inspired by jealousy of the Dutch, matured in the famous Navigation Act, passed by the Long Parliament in 1651, which provided that no merchandise from Africa or America should be imported into England in any but English-built ships navigated by an English captain, and by a crew of which at least three-fourths should be English, and discriminating duties were laid on all goods imported in foreign vessels from Europe. These prohibitory statutes were levelled against the Dutch, who had monopolized the trade of Europe. The situation of England, compared with her rivals, was much like that of the United States at present. She had a few ships, but the Dutch had more than enough to engross the trade, and could sail their ships more cheaply, and without some such protective measures they would possibly have been carrying the trade of Europe to this day.

The trade of the Dutch was suddenly stopped by the navigation laws of Cromwell, and though they fought bravely against the English, it was too late. England in turn monopolized the trade of the world, and her tonnage, under the new navigation laws (continued with but few modifications for nearly 150 years), increased from less than 200,000 to 2,000,000.

It was while under this act that England did most of her colonizing in America. The colonies were founded under this restrictive act, and after they grew into independence became the most formidable rivals of the mother country on the ocean. The restrictions placed on the colonies by England's maritime policy caused much complaint in America, and the enforcement by England, with inopportune and increasing rigor, of the strictest and most annoying regulations of her colonial and navigation laws, undoubtedly precipitated the Revolution.

After the establishment of the independence of the United States, and the foundation of the government in 1789, it was natural that a spirit of retaliation should prevail in the framing of the navigation laws of the young republic. Laws were enacted in 1790 and 1792, based on the system established in the mother country, levying tonnage dues and import taxes, discriminating to such an extent in favor of American shipping as to give a monopoly of the foreign carrying trade. A law of 1790 required that a tonnage duty of 30 cents should be levied on American shipping, and 50 cents on all foreign vessels whose countries were not in alliance with the United States. A remission of 10 per cent. of the tariff on imported goods was also allowed when imported in American bottoms.

The maritime enterprise of the American colonies had become prominent before the Revolution. Not only did the dense forests afford excellent timber for ship-building purposes, but they barred the way to the West, so that the inhabitants naturally turned to the sea. When New York city was incorporated in 1686 she had 10 vessels of 100 tons, and about 200 vessels of about 50 tons each. A considerable share of the American tonnage before the war of the Revolution was owned by merchants in England.

From the time of the Revolution up to the close of the Continental wars in Europe in 1815 the merchant vessels of England and France were in constant danger of capture, giving our flag an advantage which was sought by foreign skippers, so that American vessels became in their infancy the common carriers for the belligerent nations of the world. The fishing business, which was commenced early, soon employed a large fleet of vessels, the bulk of which enterprise settled about Cape Ann, near Gloucester, where the largest deep-sea fishing trade is still found. England was having difficulties on account of the increasing scarcity of ship timber. Our ancestors thus entered on the contest for the ocean-carrying trade under very favorable conditions, and laid the foundation of what subsequently became one of the finest fleets of merchantmen afloat. Encouraged by the fostering spirit of our early prohibitory policy, the inhabitants of the seaboard soon did a large commerce. Great Britain, whose wars caused much injury to her ships, began to feel herself checkmated on the ocean by the increasing merchant navy of the United States, and though much opposed, as a rule, to any step in the direction of relaxation, she was finally forced to relax her protective policy. In 1815 a treaty was negotiated between the two countries, by which the ships of the two countries were placed reciprocally upon the same footing in the ports of England and the United States, and all discriminating duties chargeable upon the goods which they conveyed were suspended. This treaty opened the way for further relaxation, mitigating to a large extent the restrictive measures of the British navigation system.

Other nations now began to refuse to bear longer the discriminations of England. Prussia notified Great Britain in 1823 that, until an alteration of the restrictive system was made in favor of Prussian ships, similar heavy duties would be laid upon English ships in Prussian ports. As it became obvious that other countries would not be slow to follow with corresponding movements, the celebrated Reciprocity Acts were passed by Parliament in 1824.

These statutes authorized the Crown to permit the importation and exportation of merchandise in foreign vessels at the same duties as were chargeable when imported in British vessels, in favor of all such countries as should not levy discriminating duties upon merchandise carried into their ports in British vessels; also, to levy upon the vessels of such countries, when frequenting English ports, the same tonnage rates as were chargeable upon their own vessels. At the same time the Crown was empowered to impose additional duties upon goods and shipping against any countries which should levy higher duties in the case of the employment of British vessels in the trade with these countries.

Notwithstanding the removal of prohibitory measures the tonnage of Great Britain did not increase favorably compared with that of the United States for a number of years after the passage of the reciprocity acts. From 1815 to 1842 the shipping of Great Britain increased only 40 per cent., while that of the United States increased nearly 70 per cent. This was doubtless owing to the scarcity of ship timber in Great Britain, much of which had to be transported from America and the north of Europe. The United States had plenty of timber, and. with improved machinery, could furnish vessels cheaper, and with added experience the types as well as the models of vessels were continually improving. The Baltimore clippers came in for a certain trade, and were followed by the still more famous clipper ships for the new trade that had sprung up between New York and the Pacific ports. (See CLIPPER SHIPS.) A period of high freights served to hurry onward our people, who were not slow to improve their advantages, and finally our tonnage reached nearly the same amount as that of Great Britain.

But now iron ships came in and first replaced the wooden ships that had carried coal from the north of England to London. It was at this time, when the utility of iron as a material for ship-building had been fully tested and Great Britain was in a position to defy competition in the construction of ships and steamers, and seemed in a condition to supply the rest of the world with the cheapest vessels, that she repealed her navigation laws, admitting foreign vessels to full participation in her trade, and in 1854 threw open her coasting trade. This change from prohibition to absolute free trade, though the change was a gradual one, caused much complaint among British ship-owners. Many of them declared their intention of disposing of their vessels at any price; others determined to register them under a foreign flag, but the latter course was carried out by few or none.

The American clippers, with their fine models and rapid voyages, had it all their own way in monopolizing the Pacific trade, then growing into importance. But the age of the American clipper ships was short; and though with them our tonnage reached its zenith, they had to give way to the more durable iron ships that were coming into use. During the civil war the United States continued to build ships, freights were high, and many of the ships were sold to English merchants. Our shipping began to decline from about this date. England could produce iron ships that were far more durable for the price that the United States could produce wooden ones. The ocean-carrying trade is open to the world, and whatever nation can produce the best freight ships most cheaply will furnish the ships, but not necessarily control the trade. A period of depression in freight-carrying followed the war, owing to the vast number of ships built during the war for blockade-running and cruising. There is another such depression at present in the great freight markets of the world. A few years ago freights were good and the yards of the world were kept busy, giving rise to an over-production of tonnage. This increased the carrying capacity of the fleets of the world beyond that which would, with a fair division of freights, offer remuneration to all, and ship-builders must expect dull times till this surplus is worked off. But this cannot long continue, for the population of the world increases in spite of hard times, and the productions of the industries and the soil increase with them. This means an augmentation of exchangeable commodities and adds continually to the great bulk of the world's freights. Also, with the increase of population and development of countries new fields are constantly being opened which act as safety-valves to the over-production of tonnage. A third of the shipping of the world is now engaged in trades practically unknown to commerce twenty-five years ago; thus the petroleum trade, which began about the close of the war, now gives employment to over 1000 vessels of various kinds.

The opening of the Suez Canal in 1869 was opposed by the English people, but they soon found that it gave an impetus to ship-building. The English owned 80 per cent. of the tonnage that passed through the canal, and Beaconsfield was glad to buy a controlling share of the stock, and the Gladstone government went to war to maintain control of this route to India.

The burdens of our navigation laws, which had been protested against for fifteen years or more by the ship-owners, were lessened by the passage of the shipping act of June 26, 1884, which places the sailing fleet of the United States on an equality with the vessels of other flags so far as regards the expenses of navigation. American vessels are now allowed to fill vacancies in the position of officers below that of captain by the appointment of aliens when on foreign voyages. Seamen can now be discharged in foreign ports by the consul, on mutual application of master and seamen, without the payment of extra wages. Seamen are only allowed one month's pay (formerly three) in case of injury of the vessel, unnecessary or wilful prolongation of the voyage, wilful sending of the vessel to sea in an unseaworthy condition, cruel treatment, or sale of vessel abroad. The amount paid by the government for the transportation of destitute seamen from foreign ports is increased. Slop chests must be provided on vessels for furnishing seamen with clothing. Consular fees for services to vessels and seamen are abolished, and consuls are to be paid from the U. S. treasury for such services. Vessels reporting at American consulates found consular fees cropping up for all sorts of services, the consular fee of one cent per ton representing about half the usual charges on vessels reporting at American consulates. The U. S. marine hospital's tax of 40 cents a month on seamen sailing under the American flag was considered unjust, especially as in many countries with which we have commercial relations the expenses of the hospitals are borne by the shipping of all countries that carry on trade. The burden of the marine hospitals is now assumed by the government, and receipts on account of tonnage duties are to be applied to the payment of the expenses, the tax on American seamen being abolished. (See MARINE HOSPITAL SERVICE.) Imported supplies for vessels in the foreign trade may now be withdrawn free of duty.

In order to encourage the building of ships for other countries in the yards of the United States, where import duties have been paid on foreign materials imported to be used in building a vessel, there will be allowed on this vessel, when exported, a drawback equal in amount to the duty paid on such materials; 10 per cent. of the amount being retained for the use of the United States by the collector making the payment. Seamen can now be engaged for stated periods or for round trips. Vessels can now have painted on the stern the name of the port of registry or the place in the same district where the principal owner resides; a privilege not heretofore enjoyed. Vessels in trade with *contiguous* foreign territory no longer have to pay a capitation tax on passengers. This gives vessels trading with Canada and Mexico equal advantages with the railroads running into these countries. All compulsory laws that oblige vessels to carry mails to or from this country, or that prevent the clearance of vessels with mails, are repealed. Sail-vessels now have the same privileges as steam-vessels in unloading cargoes.

Provision is made for the allowance of compensation to inspectors to vessels unloading at night. The secretary of the treasury can now refund fines, penalties, forfeitures, or exactions or charges, as he may think proper, if illegally, improperly, or excessively imposed, provided the injured party makes application within one year of the time of payment, and the secretary be satisfied on investigation as to the justice of the claim.

A very important change is that affecting the tonnage tax. Before the passage of the act of June 26, 1884, a tax of 30 cents per ton was levied annually on all vessels, while it is now provided that a tonnage tax of 3 cents per ton, not to exceed in the aggregate 15 cents per ton in any one year, shall be imposed at each entry of all vessels which shall be entered from any foreign port in North America, Central America, the West India Islands, the Bahama Islands, the Bermuda Islands, the Sandwich Islands, or Newfoundland; and a duty of 6 cents per ton, not to exceed 30 cents per ton per annum, shall be imposed upon all vessels which shall be entered in the United States from any other foreign ports. The President is authorized to suspend the collection of so much of the latter duties on vessels entered from any port in Canada, Newfoundland, the Bahamas, the Bermudas, the West India Islands, Mexico, and Central America, down to and including Aspinwall and Panama, as may be in excess of the tonnage and light-house dues or other equivalent tax or taxes imposed on U. S. vessels by the governments of the countries in which such ports are situated. This removes a discrimination against sailing vessels, which, under the old system, as they were slower, had to pay as much for one entry as some steamers did for five or six. The President has suspended the collection of the tonnage tax of 3 cents per ton on vessels arriving from the ports of Aspinwall, Panama, San Juan, and Mayaguez, in Porto Rico, Monserratt Island, all ports in the Province of Ontario, San Juan del Norte (Greytown), Nicaragua, Trinidad Island, and Bocas del Toro, as no tonnage tax or light money or other equivalent tax is imposed on U. S. vessels entering them.

The prohibition of the further payment of advance wages to seamen created great excitement. In the early years of our mercantile marine, when most of the seamen were Americans, many taking up the career in the hopes of becoming officers and masters, the payment of advance wages at least seemed to do no harm and gave the sailor a chance to provide for his family during his absence. But with a large foreign element the necessity for sailors' boarding-houses, with all their attendant evils, sprang up. The keeping of sailors' boarding-houses being a profitable one, was engaged in by unscrupulous men and soon reduced to little less than robbery. Advance wages debase a sailor by rendering him an easy prey to the shore parasites who fatten upon the weakness and improvidence of Jack ashore. By stopping advance wages the men are led to rely on their own manhood and be provident of their earnings. The improved character of the seaman resulting from this will lessen the risks of sea voyages and work to the advantage of owners, shippers, and insurance companies, and will lessen the number of the vile dens and their "runners" that destroy his health and waste his money. All this provided the system works: the British law of the same nature is a dead letter and ours as yet is simply tentative.

Another important piece of legislation is the "limited liability act," providing that the individual liability of a ship-owner for the ship's debts, except for wages due to persons employed by the owners, shall be limited to the proportion which his interest bears to the whole; before this enactment the law was interpreted as holding each owner separately for the whole debt. An objection to this law is that it covers sea-going vessels only—not taking in vessels on rivers and inland waters. Vessels on rivers have to undergo many dangers, arising from snags, shifting bars, freshets, and great numbers of vessels in small channels, and it seems no more than right that inland navigation should have the same protection as that upon the high seas. Thus, suppose we have a vessel plying between New York and Albany and one between New York and Norfolk, and imagine that each meets with a similar accident in New York Bay, producing in each case the same results. Suits for losses are brought and submitted to the same court for settlement. Under the present law the judge must decide the owners of the ocean steamer can only be held for the proportion of liabilities that their individual share in the vessel bears to the whole, while he must hold the owners of the river steamer liable each to the full extent of the losses proved. This seems a discrimination against internal commerce in favor of that on the sea-coast, the high seas, and the great lakes.

The shipping act of 1872 established the offices of the U. S. shipping commissioners, who were to be appointed by the U. S. circuit courts to superintend the shipping and discharge of seamen engaged in the merchant ships belonging to the United States, and to look out for the interests of seamen. The control of these commissioners was changed from the circuit courts to the treasury department by the act of June 26, 1884. The bureau of navigation in the treasury department, presided over by a commissioner of navigation, was established by the act of 1884. This bureau superintends the issue and surrender of all marine documents and the assignment of official numbers and signal letters to vessels, their measurement and change of name; it also compiles each year a list of the vessels forming the commercial marine of the United States. The bureau has the general superintendence of the commercial marine of the United States and of merchant seamen, and the administration of laws in respect to the collection of tonnage duties, clearance, entrance, and other movements of vessels, and the supervision of the action of the shipping commissioners.

Papers Carried by American Vessels.—In general the nationality of a ship depends upon that of the owner as determined by his domicile; but if a vessel is sailed under the flag and authorized papers of a foreign country, she must be considered a part of the navigation of the country under whose flag she sails. The mere hoisting of a flag would not be enough, as it might be possible to find a merchant master who would practise deception, so that certain documents showing the national character of merchant ships are prescribed by the laws of different nations.

After an American vessel is measured and classed by the customs authorities, she is registered and a register is given her, the register number being carved or otherwise permanently marked on the main beam of the ship, the tonnage is marked on the after beam of the main hatch, and her name and the name of the port where she is owned painted on her stern. Vessels engaged in the coasting trade are *enrolled*, not registered, while those engaged in the fisheries are *licensed.* Pleasure yachts, leaving the United States, have a special license issued by the treasury department. Registers and enrolments or licenses are distinctions with decided differences. The existing legislation of the United States is based to a large extent on distinctions made between vessels and seamen in the coasting trade and those in the foreign, and between vessels which are registered or recorded, or enrolled or licensed. The law does not absolutely require an enrolment or license; any vessel may now sail under a register, but the enrolling or licensing instead of registering is quite optional with the master or owner, and is done to save expense and annoyance. The statutes of the various States as regards taxation, pilotage and pilot dues, quarantine and harbor dues, are based upon the distinction between registered vessels and others. Not to multiply examples, in Massachusetts non-registered vessels are taxed directly, while registered vessels are exempt, the owner paying a tax upon the earnings of the vessel; in Maryland and other States the local laws compel vessels sailing under registers to pay pilotage, while enrolled vessels are exempt. The distinction between registered and other vessels aids customs officers in detecting frauds and in collecting tonnage taxes. A registered vessel can go abroad, and, therefore, may smuggle or be subject to a tonnage tax, and her papers put the officers on their guard. Enrolled vessels need not be inspected or watched in the same manner.

Foreign-built vessels, purchased and owned by citizens of the United States, are entitled to the protection of the flag as the property of American citizens; but no register, enrolment, license, or other marine document can be lawfully issued to them, nor have they the privilege of carrying the American flag, though such vessels are entitled to a certificate of ownership. Vessels built in the United States but owned wholly or in part by foreigners are entitled to be recorded.

The U. S. laws require the following documents to be on board merchantmen: the register, enrolment, or license; the shipping articles, or agreement between master and seamen; the crew list; the official log; the clearance, or paper signed by the collector and naval officer of a port, showing the vessel has legally entered and cleared the port; and the manifest of cargo. The register, shipping articles, and crew list are usually asked for to denote nationality. Other papers, besides the above, carried by vessels are the passenger list, bills of lading, charter party, if chartered, and bill of health.

Shipping.—The sea-going merchant marine at the beginning of 1886 numbered 6639 vessels of all classes, measuring 2,684,067 tons. Of this number 355 are steamers, with a tonnage of 545,187, and 6284, of 2,138,880 tons, were sailing vessels. The entire number of documented vessels under the U. S. flag, June 30, 1885, was 23,963, with a tonnage of 4,265,933.79. The estimated value of the whole amount of floating property under the flag, by the usual methods of calculation, is about $180,000,000.

The vessels of the United States engaged in commerce with foreign countries, including those vessels trading between ports on the Atlantic and Pacific coasts, number 1461, with a measurement of 1,060,264.73 tons. These are classified as follows:

Class.	Number.	Tonnage.
Steamers	113	134,036.82
Ships	308	468,117.64
Barks and barkentines	410	269,665.95
Brigs and brigantines	159	57,681.12
Schooners	465	130,616 34
Sloops, etc	6	146.86
Total	1,461	1,060,264.73

The number of vessels employed in the coasting trades and fisheries of the Atlantic and Pacific coasts, including the western rivers and all inland navigation, excepting the northern lakes, June 30, 1885, was 19,123, with a tonnage of 2,455,720.57. The vessels engaged in trade on the coasts, excluding those engaged in the fisheries and upon the northern lakes and western rivers, is 15,918, with a tonnage of 2,001,917.73.

If we include the lake and river tonnage our coasting fleet is the largest in the world, exceeding in point of tonnage the combined mercantile navies of any two nations excepting Great Britain. This fleet is well adapted, too, to the various services it is called upon to perform, and is second to none in the world in the equipment and efficiency of the vessels and the accommodations and comforts of those on board.

Before the purchase of Florida two great coasting districts were established with Florida between, but when that territory was purchased it was made a third great coasting district, the trade between these being regulated by the Revised Statutes (§§ 4348 to 4361). These laws are antiquated and cumbrous, and will doubtless soon be modified to suit existing circumstances.

The number of vessels and their tonnage engaged in the fisheries during the past three years is as follows:

Fisheries.	1883.		1884.		1885.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.
Cod and mackerel	2,249	95,038.22	2,101	82,940.31	1,803	82,564.89
Whale	141	32,414.05	121	27,248.94	113	25,183.76
Total	2,390	127,452.27	2,222	110,189.25	1,916	107,748.65

The number of vessels on the northern lakes is 3379, with a tonnage of 749,948.49. Of these 1175 are steamers, with a tonnage of 335,859.27; 1322 are sailing craft, with a tonnage of 313,128.79; and the remaining 882 vessels, with a tonnage of 100,960.43, are canal boats and barges. The climate practically closes lake navigation for three months in the year. The hardships encountered by the lake seamen, and the close competition with their neighbors on the opposite shores, have made the maritime service of the lakes one of the most enterprising and efficient in the world. Vessels on the lakes are not registered. It is difficult to tell what vessels are in the coastwise and what in the foreign business. But it is estimated that 95 per cent. of the U. S. tonnage on the lakes is employed in the coastwise commerce and 5 per cent. in the Canadian trade. The number of documented vessels on the western rivers is 1289, with a tonnage of 346,054.19. By the American Yacht List of 1885 it seems that there are 1797 yachts, but of this number only 507, with a tonnage of 20,824, have taken out official numbers; 168 of the latter, of 6160 tons, are steam-yachts.

Employment of the Vessels of the United States.

Registered tonnage:	
In the foreign trade	1,262,814.75
In the whale fisheries	25,183.76
Enrolled tonnage:	
In the coasting trade	2,882,597.49
In the cod and mackerel fisheries	73,975.23
Licensed tonnage under 20 tons:	
In the coasting trade	72,772.90
In the cod and mackerel fisheries	8,589.66
Total	4,265,933.79

WOODEN AND IRON VESSELS OF THE UNITED STATES, *June* 30, 1885.

	Registered.		Enrolled.		Licensed.		Total.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
Sailing-vessels, wood	1,934	1,096,600.15	11,047	1,606,059.84	5,577	62,846.02	18,558	2,765,506.01
Sailing-vessels, iron	[illegible]	4,992.67	3	517.80	....	....	6	5,510.47
Steam-vessels, wood	119	57,721.42	3,959	994,183.78	861	18,221.36	4,939	1,070,126.56
Steam-vessels, iron	63	128,684.27	386	295,811.30	11	295.18	460	424,790.75
Total	2,119	1,287,998.51	15,395	2,896,572.72	6,449	81,362.56	23,963	4,265,933.79
Total wooden vessels	2,053	1,154,321.57	15,006	2,600,243.62	6,438	81,067.38	23,497	3,835,632.57
Total iron vessels	66	133,676.94	389	296,329.10	11	295.18	466	430,301.22
Total	2,119	1,287,998.57	15,395	2,896,572.72	6,449	81,362.56	23,963	4,265,933.79

Encouragements to Navigation.—The value of great ship-building and ocean freight-carrying interests to a nation cannot be overestimated, and nations fostering such cast bread upon the waters that is returned many-fold. All classes, professions, and trades, merchants, bankers, and proprietors of wharves and docks, the coal interests, carpenters, blacksmiths, draughtsmen and sailmakers, the upholsterer and the cabinet-maker, the plumber and the electrician, the grower of hemp and its manufacturer, clerks, surveyors, stevedores, and thousands of employés of every grade and capacity; the farmer who produces, and the grocer who provides with supplies, and even the poor sewing girl toiling over her sewing-machine, are all benefited by great mercantile and ship-building interests.

These interests are so manifest that most governments except that of the United States have used every means to secure them. Great Britain manages this by means of subsidies. Lines of steamers are subsidized and given government backing, and where the most opposition to English shipping is found there goes the most money, so that the English lines can cut freights and break down all competitors. Capitalists of other nations see plainly that they do not compete with English ship-owners, but with Great Britain's treasury. She has made herself mistress of the commercial world, and any nation expecting to depose her must expect to back up its ships as England does.

France had cheaper labor even than England, but even with free ships she could not build up a commerce. She is now trying the effect of giving bounties to ship-builders, and also pays a certain amount per ton for every 1000 miles traversed under sail or steam. There is a cry in this country that if we can only buy cheap ships we can build up our commerce; but France, though having cheap capital and labor to run her ships, and the privilege of buying ships in the cheapest markets, found that she could not compete with England without a policy of subsidy.

The Italians had a free-ship law, which decreased the number of her ship-building yards 20 per cent. in six years. They have adopted a bounty system similar to that of the French, and also their mileage system. The Germans have entered into contracts with companies to establish certain lines and run them for 15 years, and they willingly aid German lines in forcing a trade. They now require vessels of assisted lines to be built in German yards of German material.

In 1855 American vessels carried 76.6 per cent. of our foreign freights, a percentage which has steadily decreased till, in 1881, we carried only 16.6 per cent., and in 1885 less than 10 per cent. Not a single American vessel left New York loaded with grain in 1885; but 1098 steamers and 93 sailing vessels, carrying in all 47,103,264 bushels of grain, cleared from that port during the year, all foreign owned, built, and manned. If we had kept up the percentage of 1855, three-fourths of the $200,000,000 paid for foreign freights would be paid to the ship-owners of this country. We undoubtedly pay more to have our exports and imports carried to and from this country, in one year, than the value of all the ocean ships built by our ship-builders in the last ten years.

Congress has under consideration the question of free ships, which means that Americans may import ships free of duty and register and sail them under the American flag. Those who advocate this change look no further than *first cost*. We could let in materials for the construction of foreign freight-carrying vessels free of duty, and so reduce the first cost without much present injury, and with much future good to our iron interests; for the iron furnished for the above purpose is now a small item, as the number of steamers built for foreign traffic each year could be counted on the fingers, but as ship-building increased, the demand for iron would be so great that our own manufacturers could, with much less profit on the pound, clear much more money on a largely increased output and would thus be able to enter into competition with foreign and distant markets, giving them a new and vast field for their products.

But the *first cost* is not the important thing; the difficulties only begin when you get the ship. Enormous taxation, great cost of labor to run the ship, high rate of interest, and English, French, and German ships already on all the good lines, with the good-will of the carrying trade, backed up by government help in their competition against all new-comers. In fact, if our government, instead of letting in ships free of duty, were to buy ships and give them free to companies to start up new lines, these lines would fail unless backed up by the government. Free-ship men strain at the gnat of *first cost* and swallow the camel of *taxation*, *wages*, and *interest*.

Our coasting trade has always been reserved to our flag as a right belonging to our tax-payers and as an encouragement to our ship-builders—their only encouragement in the face of thousands of other protected industries. We should continue to reserve this trade, as is done by all other nations possessing any extent of sea-coast. We have over 3000 miles on the Atlantic and 1600 miles on the Pacific, which, with 1500 miles of lake coast, amounts to over 6000 miles of coast dotted with thriving towns and busy ports, with a commerce rapidly developing into vast proportions.

Collisions.—The total number of collisions occurring to vessels of the United States by which any damage was produced amounted to 677 during the year ending June 30, 1885. Of this number 5 per cent. were totally lost. The many accidents occurring each year, often ending in loss of life, show that a strict code of regulations should govern the movements of vessels at sea, and that these should be recognized by all nations. (See COLLISION.) Laws regarding life-saving facilities—such as boats and life-rafts, and everything having to do with the safety of vessels—should be carefully enacted and rigidly enforced. (See LIFE-SAVING SERVICE.) The great wisdom and use of bulkheads was strikingly shown in the case of the accident to the Oregon, of the Cunard line (March, 1886), which was kept afloat for eight hours by her bulkheads; and had they been properly attended to and kept in a state of efficiency they might have saved her.

The general rules of the road, intended to prevent collisions, have been indicated in the article COLLISION. The following rhymes, prepared by Thomas Gray, Esq., of the British Board of Trade, and intended especially for steamers, will readily fix them in the memory:

1. *Two steamships meeting:*

When both side lights you see ahead—
Port your helm, and show your *Red.*

2. *Two steamships passing:*

Green to *Green*—or, *Red* to *Red*,
Perfect safety—go ahead.

3. *Two steamships crossing:*

If to your starboard *Red* appear,
It is your duty to keep clear,
To act as judgment says is proper—
To port, or starboard, back, or stop her!
But when upon your port is seen
A steamer's starboard light of *Green*
There's not so much for you to do,
For *Green* to port keeps clear of you.

4. *All steamers must keep a good lookout, and steamships must stop and go astern if necessary:*

Both in safety and in doubt
Always keep a good lookout;
In danger, with no room to turn,
Ease her!—Stop her!—Go astern!

Pilotage.—The employment of pilots by vessels entering strange ports is a custom which has been followed for ages. At present there are regular pilot organizations, their small vessels going far out to sea to look for incoming ships. The States of the United States pass pilot laws regulating pilotage in their own ports, though this is one of the privileges of the general government; but at the time of the foundation of the government Congress was not sufficiently acquainted with local details to pass a general pilot law, so that a law was passed that States should regulate their own pilotage. The pilot system at many of our ports is excellent; but the State laws are, in some cases, unjust and onerous as against sailing-ships. The pilot laws of the several States are not alike.

The master of a coasting sailing-vessel can employ or not, as he chooses, a State pilot in the ports of Maine, New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, California, and Mississippi; in South Carolina this applies only to vessels trading between ports in that State; in Florida, to vessels owned in the State; in Georgia, to vessels trading between her ports or with the ports of Florida and South Carolina; and in Pennsylvania, to coast-laden and outward-bound vessels. But the same vessel must pay a pilot or pilotage tax, whether a pilot is needed or used, in the waters of Delaware, Maryland, Virginia, Texas, Alabama, North Carolina, South Carolina (vessels trading with ports out of State), Oregon, Louisiana, Georgia, and Florida (vessels owned out of State).

A sailing- or steam-vessel in the foreign trade is required to pay for the services of a pilot, even when one is not employed, in every State except Maine and New Hampshire; the dues varying from $2.25 per foot draught in New Bedford, Mass., to $6.37 per foot in New York. Delaware imposes a tax on vessels going to Philadelphia by making them pay for an unnecessary Delaware pilot while passing up Delaware Bay and River. An instance was presented to a committee of the Forty-eighth Congress where a small American vessel had to pay $840—one-tenth her freight money—for pilotage on ten trips, though the master never employed a State pilot, but either took a tug or piloted himself. The compulsory pilotage system is being abolished in many large foreign seaports, without working any injury to the general safety of navigation or to the pilotage service.

Seamen of the Merchant Marine.—A U. S. shipping commissioner ships the crews of vessels other than those bound for British America, the West India Islands, or Mexico. The ship is got ready for sea by stevedores and riggers, and when ready for a crew the captain informs the shipping commissioner, who posts up a notice naming the vessel, master, destination, wages, term of service, etc. When men are abundant the men assemble and are selected by the master; but when scarce there is always trouble, as boarding-houses and resorts have to be visited and the men asked to come. The shipping articles, or contract between the master and the crew, are signed by the men according to their grades. The shipping commissioner is informed at what day and hour the vessel is to sail, and he endeavors to get the crew all on board in time. When on board the roll is called, and as each man answers he is asked if he has shipped in such a grade and for such wages, and if he is willing to go on the voyage. When men cannot be got in the regular way they are sometimes "*shanghaed;*" that is, drugged or intoxicated and then taken on board in this condition.

The number of men necessary to sail our merchantmen is somewhere near 50,000; and as the annual drainage is about 8 per cent., it is seen that we need about 4000 new men each year, showing how necessary it is to devise means to encourage the enlistment of young Americans in the service. The more Americans we have on our merchantmen the more men will we have to rely on to man our navy in case of a war.

Great good has been done by the establishment of the New York Nautical School on board the St. Mary's. This is intended to train up and educate American boys to be good seamen for the merchant service. This school, founded ten years ago, turns out about 30 well-educated young seamen each year. Sixty-nine per cent. of the graduates go to sea. The secretary of the navy is authorized to furnish, on application of the governor of a State, suitable vessels of the navy, with charts, books, and instruments of navigation, if the vessels can be spared without detriment to the naval service, for the benefit of nautical schools at New York, Boston, Philadelphia, Baltimore, San Francisco, Charleston, Savannah, Mobile, New Orleans, Baton Rouge, Galveston, and Narragansett Bay. Some of these places have many lads growing up in idleness, and school-ships would give these boys a chance to become efficient seamen, with education fitting them for the highest positions in the merchant marine. The proportion of foreign-born seamen in our merchant service is now probably more than 50 per cent. These are chiefly Germans, Scandinavians, British, and Italians, attracted by the higher rates of wages paid on our vessels. The proportionate number of seamen employed on merchant ships is decreasing. This is due to the fact that ships are getting larger, and that labor-saving appliances are being fitted to do the heavy work. The estimated average, all told, to the 100 tons register, taking in all sizes of vessels, is:

	American.	English.
For sailing-vessels	2.10	2.60
For steamers	2.50	3.00

Average of Seamen's Monthly Wages.

Port.	Coastwise.	Foreign.
New York	$18.40	$16.40
San Francisco	32.65	25.96
Philadelphia	19.00	17.25
Boston	21.25	17.50
Baltimore	17.00	17.00
New Orleans	21.75	18.83
Portland, Me	17.00	
Bath, Me	21.33	20.00
Providence, R. I	20.08	20.00
New Bedford	22.00	18.00
Norfolk	18.00	18.00
Charleston	21.25	21.25
Savannah	20.00	14.50
Brunswick, Ga	19.50	19.33
Astoria, Oreg	22.50	30.00

Signaling at Sea.—In early times each nation possessed a system of signals understood only by vessels under the same flag, but the increase in the numbers of the merchant fleets of the world demanded a system which could be read by all nations irrespective of language. There was naturally some trouble in arriving at this, as each nation had different views, and much misunderstanding occurred when vessels of different nationalities undertook to communicate with one another.

The need of a uniform system having made itself felt, the British Board of Trade, in 1856, recommended an international code of signals, which was adopted by the British government. This code, consisting of 19 flags of easily distinguishable colors and combinations of colors, has been officially adopted by most nations except the United States, though it has been practically adopted by the U. S. merchant marine. This code is now the only one used at the signal stations of Great Britain and her possessions. All ships should be required to have this code, as instances are cited where ships have been lost through the inability of the persons on board to read international signals warning them of danger.

We have a system, which is used on our men-of-war, of flags denoting numbers, which are hoisted one above another, the corresponding number shown being sought in the signal-book, and opposite it is found the sentence which was intended to be communicated. Messages are also communicated by the movement of flags, one system using a flag in each hand and another using only one flag. In the latter a movement of the flag to the right means 1, and to the left means 2, and by 4 combinations of the 1 and 2 different letters are denoted, so that words can be spelled out. All nations have private codes of signals which are for use during war.

As the flags of the international code can only be seen by day, the need of a system of night signals adapted to the same code is much felt, but none as yet has been adopted. We make use of colored lights representing, by combinations, sentences found in the signal-books. The Coston signals are fired from a rocket-pistol, while the Very night signals are burnt on the ship. A light placed at the end of a pole and waved to the right and left is also made use of. Capt. Joseph Wall has invented a system which may come into use. This consists of three horizontal lamps on an arm, which is pivoted so that the three lights can be seen by the signaled ship. Each lamp can be made to show a white, red, or green light, and by combinations of these lights all the signals of the code can be given as rapidly as by means of the flags in the daytime.

Distress Signals.—When a vessel is in distress and requires assistance from other ships, or from the shore, she must display the following signals, together or separately:

In the daytime—

1. A gun fired at intervals of about a minute.
2. The international code signal of distress indicated by N. C.
3. The distant signal, consisting of a square flag, having above or below it a ball, or anything resembling a ball.

At night—

1. A gun fired at intervals of about a minute.
2. Flames on the ship (as from a burning tar-barrel, or oil-barrel).
3. Rockets or shells, throwing stars of any color or description, fired one at a time at short intervals.

(L. N.)

NAVIGATION, INLAND. This subject, as here treated, includes navigation by the rivers, lakes, and canals, forming the great inland water system of the United States. We have a line of interior communication upon which we can depend in time of war, when our coasts are blockaded, to furnish transportation for our interstate commerce. This line runs as follows: beginning at the bay north of Cape Cod, it passes overland to either Buzzard's Bay or Narragansett Roads, thence by way of Long Island Sound to New York, then by the Raritan River to New Brunswick, and by the Delaware and Raritan Canal to the Delaware River at Bordentown, down the Delaware to Delaware City, and thence by the Delaware and Chesapeake Canal to Chesapeake Bay, down the bay, up Hampton Roads and the Elizabeth River, thence through the Dismal Swamp Canal and the Albemarle and Chesapeake Canal to Albemarle Sound, thence through the swamps and land-locked sounds and lagoons of the Carolinas and Georgia to Florida, overland to the Gulf of Mexico, and thence through interior sounds and bays to New Orleans.

The route from the North-west to the seaboard is by way of the Great Lakes. At the eastern end of the lakes commerce has a choice of one of two routes: the Canada route by the way of the Welland and St. Lawrence Canals to the St. Lawrence; or the New York route, by way of the Erie Canal and the Hudson River to New York. Neither the United States nor Great Britain can (by treaty) keep afloat or build a fleet of war vessels on the lakes. As, in the event of war, Great Britain would of course wish to strike a blow at our commerce on the lakes, and lay under tribute the wealthy cities and towns on their shores, she has, with her usual foresight, provided means by which she can send a fleet of light-draught, heavily armed gun-boats to the lakes in spite of opposition on our part. Seeing that we might erect powerful forts upon the St. Lawrence, Great Britain cut a canal from the foot of Lake Ontario, on a line parallel to the river, but beyond the range of our guns, to a point of the St. Lawrence below, out of American jurisdiction. A canal was also constructed around the Niagara Falls, thus opening the entire chain of lakes to British war vessels. They have established also a large naval depot at the head of the St. Lawrence for the construction and repair of vessels, protected by a strong fort. The locks of the Welland Canal admit vessels 270 feet long, 45 feet beam, and 13 feet draught. The St. Lawrence Canal has a capacity great enough for vessels of 700 tons, but it will doubtless be increased to the size of the Welland Canal before long.

In 1875 Congress, wishing to provide means whereby grain might be shipped from navigable affluents of the Mississippi to Chicago without breaking bulk, ordered a series of improvements, which are still going on, involving the improvement where necessary and the connection of the Wisconsin and Fox Rivers, giving a continuous navigable channel, with a minimum depth of 5 feet, from Prairie du Chien on the Mississippi to Green Bay, an arm of Lake Michigan. Another route was determined upon that could be made available for gun-boats. This was by the Hennepin and Illinois Canal from Watertown on the Mississippi to Hennepin on the Illinois, thence, by slack-water navigation, around the rapids at Marseilles by canal to La Salle, and thence by the Michigan and Illinois Canal to Chicago; the whole to be enlarged and deepened to a minimum depth of 8 feet. Also, surveys are being made to fix a route by which steamers can load at ports of the upper Mississippi with produce for Europe. But we should not have to depend upon the English canals, especially as Montreal is rivalling New York as a shipping port for western produce for Europe, with the present canal system.

Congress has directed that surveys and estimates be made of the routes available for the purpose of carrying vessels to tide-water on the Atlantic, so as to be independent of the English canals. These routes are three in number: (1) The Erie Canal, from Buffalo to Albany; (2) the Oneida Ship Canal, from Oswego to Albany; (3) the Champlain Ship Canal, from Lake Champlain to deep water on the Hudson.

The Erie Canal was completed in 1826, and travel was so great over it that at the end of 9 years it was enlarged to three times its original capacity, and were it not for the hold that railroad corporations seem to have on legislation it would doubtless have been made much larger than the English canals long before this. This canal is now 80 feet wide at the top and 60 at the bottom; the depth from Albany to Rochester is 7 feet, from Rochester to Lockport the depth increases to 7½ feet, and beyond Lockport it increases to 9 feet at the terminus. Congress has under consideration a bill appropriating $1,000,000 a year for ten years, to be expended in converting this canal into a great ship canal. If this is done, products can be shipped from the Western States direct to New York, or loaded at Chicago on ocean vessels for any part of the world.

The Oneida Lake route begins at Port Dalhousie, near the western end of Lake Ontario, thence by the lake it runs to Oswego, by the Oswego Canal thence to Brandy Brook, near Phœnix, by a new canal and Oneida River to Oneida Lake, by the lake and Oneida Canal to Durhamville, where it connects with the Erie Canal, and thence to Albany, forming a water route from Lake Ontario to the Hudson. The general government wishes to convert this into a ship canal of sufficient capacity to accommodate vessels that can pass through the Welland Canal.

The Champlain Canal connects Lake Erie with the Hudson River by the way of the Welland Canal, Lake Ontario, the St. Lawrence River, canals to Caughnawaga, a new canal from Caughnawaga to St. John's on the Richelieu River, the Richelieu River to Lake Champlain, Lake Champlain to Whitehall, a new canal in connection with Wood Creek to Fort Edward, and the Hudson River by means of slack-water navigation to Troy, thence to New York by the Hudson River, with increased depth, or leave the river above the Troy dam, and pass by means of the Lower Mohawk and the Erie Canal to deep water at Albany.

With the completion of the above routes the United States will be even better situated than the English, for vessels with freight could enter the lakes much earlier in the spring from New York than they could pass up the St. Lawrence. Gun-vessels and munitions of war could also be sent more quickly from New York to Lake Erie than they could be sent from the mouth of the St. Lawrence.

In 1875 Congress ordered surveys to be made with a view of establishing a connecting link by canal or a freight railway from the Ohio River or Kanawha River, near Charlestown, by the shortest and most practicable route through West Virginia, and to tide-water in Virginia. The route, for which large sums have already been appropriated, runs from Newport News up the James River to Richmond, thence by the river, or by taking advantage of the present canal to Covington, thence by a short cut with the Greenbriar, down that stream to the Great Kanawha, and thence to the Ohio. The work is steadily progressing, and it is only a question of time as to when it will be finished. The Chesapeake and Ohio Canal runs with a depth of 6 feet from Alexandria to Cumberland. Numerous surveys have been made for its extension to the Ohio, but nothing has been done in the way of cutting.

A route which will doubtless exist at a future time—one of the four great routes for which surveys were ordered by Congress in 1874—is from the Mississippi to the Atlantic seaboard, communicating by canal from some convenient point of the Tennessee River with the Coosa, the Ocmulgee, and Altamaha Rivers, and thence to Brunswick or Savannah on the seaboard. The length of this route from St. Louis by the way of Cairo would be 1574 miles, and it is designed to carry boats of 300 tons. This route would be free from ice, a decided advantage in winter, as 10,000,000 bushels of grain were stopped on the Erie Canal in 1872 by a night's freeze.

The Mississippi and Florida Peninsula route comprises the Mississippi from St. Louis to New Orleans, thence by an interior line along the Gulf coast to St. Mark's, on the west coast of Florida, and thence across the peninsula by canal, slack-water, and open river navigation to St. Mary's, on the Atlantic Ocean. This will afford a cheap means of sending eastward the products of the Mississippi Valley over a route which shortens the time and avoids the dangers of a trip through the Gulf of Mexico and the Florida Straits. From New Orleans to the west coast of Florida the route already practically exists, as there is a nearly continuous land-locked water route by means of sounds, bays, and streams. It will require some dredging, but very little cutting. With this, or by making short outside cuts, Mississippi grain barges 220 feet long, 40 beam, and 9 feet draught can pass between New Orleans and the west coast of Florida, so that there only remains the completion of the Florida ship canal to finish this one of the four great routes recommended by the Senate Committee on Transportation Routes to the Seaboard for completion by the government. The ten grain States of the Mississippi Valley produce nearly 70 per cent. of all the cereals of the United States, and though covered with railroads it takes the produce of three acres to get that of one to market. When corn sold at 90 cents in New York it was burned for fuel in Iowa; and when wheat sold for $1.35 in New York it brought 45 cents in Minnesota; and when beef brought $7 a hundred on the hoof in the East, cattle were being slaughtered for their hides in Texas. This shows the urgent need of cheap inland navigation, and led to the designing of the above routes of communication.

STATISTICS OF SOME OF THE CANALS OF THE UNITED STATES.

Names and places connected.	Dates built and enlarged.	Length.		Width.		Depth.	Locks.				Cost.
		Canal.	Slack-water.	Surface.	Bottom.		Number.	Length.	Width.	Rise and fall.	
		Miles.	Miles.	Feet.	Feet.	Feet.					
Lake Superior Ship Canal:	1868										
Lake Superior to Portage Lake	1873	2.12	......	100	......	14	......	....	......	......	$3,925,300
Saint Mary's Falls Canal	1853–55	1.02	......	100	......	17	1	515	80	18	3,500,000
Illinois and Michigan Canal:											
Chicago to La Salle	1836–48	102	......	60	......	6	15	110	18	141	6,557,681
Ohio Canal and feeders:											
Cleveland and Portsmouth	1825–35	323	......	40	26	4	150	90	15	1,207	4,695,202
Miami and Erie feeders:											
Cincinnati and Toledo	1825–35	284	......	50–60	......	5½	93	87–99	15	907	7,144,234
Erie branch and feeders:											
Albany to Buffalo	1817–62	365	29.6	70	52½	7	72	110	18	656	51,609,200
Oswego Canal:											
Syracuse to Oswego	1825–62	18	20	70	56	7	18	110	18	155	3,077,429
Champlain feeder and dam:											
Whitehall to Waterford	1817–70	81	......	58	44	6	33	110	18	179	2,378,910
Delaware and Hudson Canal Company:											
Honesdale, Penna., to Rondout, N. Y.	1826–28	108	3	48	32	6	107	100	15	1,028	6,339,210
Delaware and Raritan feeder:											
Ball's Island to Trenton	1838	22	......	60	......	6	1	100	24		
Chesapeake and Delaware:											
Delaware City to Chesapeake City	....	14	......	66	......	9	3	220	24	32	3,730,230
Albemarle and Chesapeake:											
Norfolk to Currituck	1855–60	14	30	80	60	7½	1	220	40	2	1,641,363
Dismal Swamp:											
Elizabeth River and Pasquetank	1794	28	1	40–60	......	6	7	100	16½	35	1,151,000
Fairfield Canal:											
Alligator River to Mattesumskeet Lake	1868	4½	......	40	......	6	......	....	......	......	100,000
Chesapeake and Ohio Canal:											
Cumberland and Alexandria	1826	....	......	....	......	6					
Newberne and Beaufort Canal Company:											
Clubfoot Creek to Newport River	1880–82	3	......	80	......	10	......	....	......	......	200,000
Augusta Canal:											
Savannah River to Augusta	1847	9	......	150	......	11	......	....	......	......	1,500,500
Ogeechee Canal Company:											
Savannah River to Ogeechee River	1829–40	16	......	120	......	8	5	....	......	......	407,818
Santa Fé Canal Company, Florida:											
Waldo and Melrose, Florida	1877–80	10½	......	35	......	5	......	....	......	......	70,000
New Orleans to Pontchartrain	1832–35	6½	......	85	......	7	......	....	......	......	1,000,000
New Orleans to Bayou St. John	1794	2	......	60	......	7	......	....	......	......	750,000
Orleans Bank Canal	1832–35	6½	......	85	......	7	......	....	......	......	1,000,000
Harvey's Canal	1830	5¾	......	45	......	6	3	200	35	......	150,000
Tagliaferro Canal	1880–81	1¾	......	30	......	4	2	110	20	......	40,000
Galveston and Brazos Navigation	1850–51	8	30	50	......	3½	......	....	......	......	340,000

Lake Harbors.

As an appendix to our consideration of Inland Navigation we present a view of the Harbors on the Great Lakes, omitted in treating of the Harbors of the United States. Duluth, Minn., has an artificial harbor, made after cutting a canal through Minnesota Point. The dredged basin has a length of 3200 feet and a breadth of 1450 feet—depth over about three-fourths this area, mostly near the docks, is 16 feet.

Grand Marais, Minn., has a harbor, formed by dredging, protected by a breakwater. Vessels drawing 16 feet can now enter. Ontonagon Harbor, Mich., had shallow water at the mouth of the river, so piers have been run from the mouth lakewards, and the bottom between them dredged to a depth of 12 feet at low water. The steamboat dock in the harbor, at the mouth of Cedar River, can be approached through a dredged channel 50 feet wide and 14 feet deep. Oconto, Wis., has an entrance from deep water in Green Bay through an 8-foot channel, dredged between two slab piers, north and south of the harbor entrance. Pensaukee Harbor is approached through a similar channel 8 feet deep. Green Bay Harbor has a dredged channel to the deep water of the bay, 200 feet wide, 14 feet deep, and two miles long, including a cut across Grassy Island. The harbor of refuge at the entrance of Sturgeon Bay, Wis., has two piers, each 1200 feet long, 850 feet apart at the shore-line, enclosing the lake entrance to the canal, and converging so as to make the harbor entrance 235 feet wide. Beyond them are placed two detached piers, each 150 feet long, with 335 between their outer ends at the 18-foot curve in the lake; each detached pier connected with the adjacent main pier by a double row of fender piling. The channel is 16 feet deep. Ahnepee Harbor, Wis., has a small artificial harbor formed by piers, with a dredged channel 12 feet deep. Kewaunee Harbor is to be improved by cutting through the spit between the river and the lake, continuing the channel to deep water by means of piers, making the whole 18 feet deep. Two Rivers, Wis., had the natural channel obstructed by a bar with only 3 feet of water, but this is to be deepened to 12 feet and a channel formed by piers. Manitowoc had a similar bar, and the channel is to be deepened in the same manner to 14 feet.

Sheboygan Harbor, Wis., is approached through a channel between piers carried out to the 20-foot curve, dredged to 18 feet between the outer ends—the depth decreasing to 14 feet at the shore-line. The distance between the piers is 175 feet at the shore-line, increasing to 275, at which distance apart they are continued further parallel. Port Washington Harbor, Wis., is to have two interior basins dredged to a depth of 12 feet, with a channel of the same depth connecting them with the lake. The channel entrance to the basins to be north of the south entrance of the Sauk River is enclosed between two piers, so constructed that the flow of the river will be separate from the channel, and the débris brought down by freshets, instead of shoaling the channel, will reinforce the south pier.

Harbor of refuge, Milwaukee Bay, Wis., is an artificial one, formed by enclosing a portion of Lake Michigan within an outlet breakwater of crib work upon a stone foundation. This harbor will furnish 417 acres of safe mooring ground beyond the 18-foot curve. Milwaukee Harbor has an 18-foot channel at the entrance to the river, protected by piers. Racine Harbor, Wis., originally varied in depth from absolute closure after storms to about 6 feet. There is now a dredged channel between piers 13¼ feet deep. Kenosha Harbor will have a similar channel 15 feet deep. Waukegan Harbor is to have a small artificial basin dug in the low ground between the lake and the bluffs, entered through a dredged channel.

At Chicago Harbor the improvements now in course of execution comprise an outer harbor adjoining the Chicago River, with a depth of 16 feet, designed to furnish increased commercial facilities by relieving the river of its crowded condition, and a harbor of refuge affording good anchorage in deep water and safe access to the harbor and river.

Calumet Harbor is approached through a dredged channel 300 feet wide and 16 feet deep, from Lake Michigan to the Calumet River.

Michigan City has an outer and an inner harbor, capable of admitting all classes of lake vessels in all weathers, though before the present improvements there was only a small creek, obstructed by bars. The inner harbor has been deepened at shoal points to 17 feet, and the heaviest loaded vessels can pass to any part of it. The present project, which is being carried out in the improvement of Charlevoix Harbor, Mich., is to dredge a channel 150 feet wide to a depth of 12 feet, and to protect the sides of this channel with crib work.

Frankfort Harbor is reached through a dredged outlet through a strip of land separating Lake Aux Becs Scies from Lake Michigan, 195 feet wide and 14 feet deep. The harbor of refuge at Portage Lake, 18 feet deep, is included between two piers 370 feet apart. Manistee Harbor is to have a channel of entrance with 12 feet of water, as is also Ludington Harbor. Pentwater and White River Harbors are to have entrances 12 feet deep. Their original entrances were narrow and shoal. Muskegon Harbor had originally a channel irregularly defined by slab piers, which gave fair access, but a bar just at the end of the piers, on which there was only 7 feet of water, obstructed navigation. Improvements are making to provide a channel of navigable width and 17 feet over the bar, with an entrance 300 feet wide. Grand Haven had only 9 feet in its natural outlet, but this is being deepened to a minimum depth of 18 feet. Grand River has now 4 feet of water at low water, thus giving passage to light navigation. Black Lake Harbor had a narrow, irregular channel 5½ feet deep, but dredging is being carried on with a view to obtaining a depth of 12 feet through a channel of navigable width of entrance. Saugatuck Harbor is to have a channel dredged to a minimum depth of 10 feet, South Haven Harbor a channel 14 feet deep, and St. Joseph's Harbor a channel 16 feet deep, all protected by piers. The Harbor of Cheboygan, Mich., has a depth of 15 feet in the basin opposite the steamboat landing, and a 15-foot channel to the Straits of Mackinac, only 90 feet wide in parts. Thunder Bay has a channel entrance of navigable width with a depth of 14 feet. The physical characteristics of Au Sable Harbor are such as to render the duration of any improvement quite limited. It is proposed to dredge a channel 100 feet wide and 12 feet in depth. The harbor of refuge, Sand Beach, Lake Huron, Mich., was designed to afford refuge to vessels engaged in the navigation of the lakes when caught by heavy weather near the dangerous Point Aux Barques. Previous to 1876 vessels so caught were compelled to run a distance of 60 miles and find refuge in the St. Clair River. The ice harbor of refuge at Belle River, Mich., consists of a channel 50 feet wide, 13 feet deep to the first bridge, and 12 feet deep to the second bridge, affording a safe harbor against running ice. The mouth of the Detroit River is to be deepened to 20 feet. Monroe Harbor, Mich., has a canal between the river and the lake, the entrance into the lake protected by piers, the depth being 10 feet. Toledo Harbor is approached by a channel dredged through Maumee Bay, 200 feet wide, with a depth of from 15 to 17 feet at low water between Toledo and deep water in the lake. Port Clinton Harbor has an artificial channel giving a depth of 9 feet from the lake to the town, but a bar has formed in the lake beyond the ends of the piers with a least depth of 7½ feet for a short distance.

Sandusky City Harbor is approached by a channel through the outer bar about 150 feet wide and 14 feet deep, and through the bay and up to a point 50 feet from the line of docks with a width of 200 feet and a depth of 15 feet. Huron Harbor is approached between parallel lines of piers running out into the lake, giving a good, wide channel with a least depth of 14 feet.

Vermilion Harbor has parallel piers running out into the lake, with a depth of 12 feet between. The approach to Cleveland Harbor in 1825 was over a long, low sand-bar where the river now empties into Lake Erie, and the entrance was through a narrow, intricate channel, with a depth of about 3 feet. There is now a good, wide channel at the entrance to the harbor, with a depth of from 17 to 20 feet between the lake and the railroad bridge at the end of the piers, with a pile protection work 620 feet long at the inner end of the west pier, constructed in 1882 to prevent vessels from getting on the old sunken pier. The present project for a harbor of refuge provides for an outer breakwater, starting from the lake shore about 700 feet west of the upper end of the old river bed. This breakwater runs out due north a distance of 3130 feet to a depth of 28 feet; it then turns and runs 4030 feet parallel to the shore, with a spur 100 feet long on the north side of the lake arm, and 200 feet from its eastern end, in a depth of from 28 to 30 feet. The entrance on the east side will be protected by extending the east pier at the mouth of the river 1400 feet. Fairport Harbor, at the mouth of the Grand River, is approached between parallel piers 200 feet apart, with a depth of 16 feet. Ashtabula is approached between piers running out into the lake from either side of the mouth of the river, with a depth of 16 feet. Dredging will probably be necessary as often as once every two years to keep this depth. Conneaut Harbor, Ohio, has a channel entrance with a depth of from 9 to 11 feet. The bar at the entrance has 10 feet of water on it. Erie Harbor has 16 feet in the channel from the harbor to the lake. Dunkirk Harbor is an artificial one formed by a breakwater nearly parallel to the shore. The entrance is through a channel 13 feet deep, but quite narrow, and presenting the ragged edges of the unblasted rock jutting out on either side. The harbor is open to wind and waves from any direction between north-west around to north-east. Buffalo Harbor is formed by a breakwater of crib work 7600 feet long running parallel to the shore, and an arm of pile and crib work 4100 feet long running out towards the southern end of the main or detached breakwater, leaving an opening about 150 feet wide between them. Wilson Harbor, N. Y., is approached by a channel of navigable width between piers, with a depth of 8 feet at low water. Olcott Harbor is similar and has a depth in channel of 7½ feet. Oak Orchard and Charlotte Harbors are similar also, the former having a depth of 9 feet and the latter 15 feet. Pultneyville has a harbor formed by breakwaters, with a channel 6 feet deep. Great Sodus has a harbor formed of two breakwaters forming an angle, and from the opening parallel piers extend into the lake, the channel between now having a depth of 10 feet. Little Sodus Harbor has a somewhat similar construction, the channel between the piers being 14 feet, but only 12 feet can be carried over the bar just outside. Oswego Harbor is formed by one breakwater 5800 feet long and one 2700 feet long; the mouth of the river has been deepened to 15 feet, the whole securing full protection to the docks and wharves west of the river mouth, and channels of entrance 16 feet deep and 350 feet wide each to the inner harbor and to the outer harbor. Sackett's Harbor, N. Y., has been formed by dredging over an area of 15 acres to a depth of 12 feet. Low jetties are contemplated to protect the harbor from the shore-drift around Ship House Point. Ogdensburg Harbor has been formed by deepening the channel along the St. Lawrence River front, one mile being 12 feet deep, one-quarter of a mile 14 feet deep, with a channel leading to the deep water of the St. Lawrence 15 feet deep.

Plattsburg Harbor, on Lake Champlain, is formed by a breakwater about 1000 feet distant from the wharves and docks, with an extension to the south-east protecting the shipping from easterly and southerly storms. Swanton Harbor, Vermont, has a breakwater 259 feet long, which, being located before the wharves and docks, is too far away to afford any protection. Burlington Harbor is protected by a breakwater about 1000 feet distant from the wharves. In its natural condition the harbor was unsheltered from northerly, westerly, and south-westerly winds.

In the preparation of the foregoing articles the following sources have been freely drawn from: *The Reports of the Commissioner of Navigation*, Patten; *Marine International Law*, by Commander Glass, U. S. N.; *The Strategical Value of the Inland Canal Navigation of the United States*, by Lieut. Bliss, U. S. A.; *Publications of the Office of Naval Intelligence; Reports of the Chief of Engineers, U. S. Army.* (L. N.)

NAVY OF THE UNITED STATES. *Historical Sketch.*—When the Federal government was organized in 1789, the war and navy departments were under one head, presided over by the secretary of war. During the eight years following the adoption of the Constitution there was practically no navy in existence. The few armed ships that the government had at its disposal were hired ships, manned by volunteer officers and men, and their functions were more nearly those of a revenue marine than of a national navy. In 1797 Congress, becoming alarmed on account of the condition of maritime affairs resulting from the almost universal state of war then prevailing, authorized the President to organize the *personnel* and create the *materiel* of a regular naval force.

George Cabot was the first secretary of the navy, being nominated and confirmed May 3, 1798; he resigned and was succeeded May 21 of the same year by Benjamin Stoddart. The navy department under Secretary Stoddart was but a small affair, consisting of the secretary, a chief clerk, 12 clerks, and 2 messengers. Mr. Stoddart remained in office till July, 1801, in which time there were built for the navy the Constitution and the United States, each mounting 44 guns; the Philadelphia, 38; the Congress and the Constellation, each 36; two sloops-of-war and one brig. Besides these, one frigate, two brigs, and several schooners were purchased, and one vessel was presented to the government by the State of New Hampshire. Though the little navy was kept busy at sea during war with France in 1799, and with Tripoli in 1800–1803, no addition or modification of the civil force of the department was found necessary.

At the outbreak of the war of 1812 Paul Hamilton was secretary of the navy. In the meantime navy-yards had been created at Washington, Brooklyn, and Boston. All the vessels in the navy were commissioned at once, the clerical force was increased to 22, besides the clerks employed at the navy-yards and the navy offices which were established at Philadelphia, Baltimore, New York, Boston, Charleston, and Sackett's Harbor. Mr. Hamilton was succeeded by William Jones in 1813, who in turn was succeeded by B. W. Crowninshield in December, 1814. No change was found to be necessary in the civil organization of the department which directed the navy while it was making its brilliant record of the war of 1812.

After peace was declared Congress adopted a definite policy for the increase of the navy. Several unfinished vessels, which had been authorized during the war, were finished, and appropriations were made for a number of vessels, some of them of great size and heavy armament. Provision was also made for increasing the efficiency and number of the navy-yards. All this made the duties of the secretary very arduous, and Mr. Crowninshield recommended the organization of a staff to aid the secretary of the navy in professional and technical matters. This was the origin of the board of naval commissioners, first presided over by Decatur.

The early navy had no staff corps as now understood. The pursers of the ships performed the duties of the present pay corps and reported their accounts directly to the secretary. Surgeons were employed from civil life, and made their own purchases of medicines, etc., as they were needed, their accounts going with the general charges of the ships in the purser's reports. The constructers were skilled men employed from civil life, who were allowed wide discretion in the employment of labor, purchase of material, etc., and, like the others, settled accounts with the secretary in person. This simple system ended with the establishment of the board of naval commissioners which lasted for 25 years, during which time the U. S. navy, though small, had the best and most efficient ships, rate for rate, in the world.

In 1839 Congress called upon the secretary by resolution to propose a plan of reorganization, embracing a division of the duties performed by the board of naval commissioners, and their assignment to separate bureaus. The secretary, in December, 1842, reported a system, and in 1842 bureaus with independent heads were first established, placing the administration of the navy under five heads. The original titles of the bureaus were:

1. The Bureau of Yards and Docks.
2. The Bureau of Ordnance and Hydrography.
3. The Bureau of Construction, Equipment, and Repair.
4. The Bureau of Provisions and Clothing.
5. The Bureau of Medicine and Surgery.

No officer of less rank than that of captain was to be eligible to the offices of chiefs of the bureaus of yards and docks, and ordnance and hydrography. The heads of the bureaus of construction and medicine were staff officers, and the head of the bureau of provisions and clothing a civilian. This system worked well till the outbreak of the civil war, undergoing no change except the natural development of a new bureau, that of steam-engineering, as steam came to be applied to the propulsion of vessels.

With the civil war it was found necessary to make a new distribution of bureau duties. Yards and docks, medicine and surgery, and provisions and clothing were undisturbed. Equipment was taken from the bureau of construction, and a new bureau of equipment and recruiting formed. The bureau of ordnance and hydrography was abolished, and its duties divided between the two bureaus of navigation and ordnance. The chiefs of the bureaus of navigation, yards and docks, equipment and recruiting, and ordnance must now be line officers with a rank not lower than that of commander. The chiefs of bureaus of construction, steam-engineering, and medicine are appointed from the members of their respective corps, having a relative rank not lower than that of commander. The chiefs of bureaus are appointed by the President, by and with the advice and consent of the Senate, and the appointment continues for four years. Chiefs of bureaus below the rank of commodore have the relative rank of commodore, and draw the highest pay of their grade.

The present secretary of the navy has recommended, and Congress has now under consideration, a division of the duties of the navy department under three heads:

1. *Personnel* and fleet, covering the enrolment, service detail, uniform organization, and discipline of the *personnel*, and the movements and command of the vessels and fleets when in commission.

2. Department of *materiel* and construction, covering the construction and care of vessels before commission, and their armament and equipment, also the management and maintenance of dock-yards, including their buildings, machinery, and civil establishment.

3. Department of finance and accounts, covering the purchase of all naval stores, flags, coal, stationery, and care of storehouses, etc.

Officers of the Navy.—Line officers exercise military command in the following order:

Admiral	ranking	with	General	in the army.
Vice-Admiral	"	"	Lieut.-Gen.	" "
Rear-Admiral	"	"	Major-Gen.	" "
Commodore	"	"	Brig.-Gen.	" "
Captain	"	"	Colonel	" "
Commander	"	"	Lieut.-Col.	" "
Lieut.-Commander	"	"	Major	" "
Lieutenant	"	"	Captain	" "
Lieut. (junior grade)	"	"	First Lieut.	" "
Ensign	"	"	Second Lieut.	" "

Officers of the navy are never to assume command of land forces on shore, nor can any officer of the army assume command of any vessel of the navy of the United States or of any officers or men belonging to them unless by special authority for a particular service. But when officers of the navy are employed on shore, on service with the army, their relative rank will carry with it all precedence attaching to the rank with which it corresponds, except command, and will regulate their quarters.

Staff officers exercise no military command other than in the corps or department to which they belong or over those placed under their command by competent authority. The officers of the staff of the navy consist of the medical, pay, and engineer corps, chaplains, professors of mathematics, naval constructers, civil engineers, and secretaries to admiral and vice-admiral. These officers have relative rank with the officers of the line.

Officers are addressed solely by their titles as given in their commissions and stated in the Naval Register, those below the rank of commander of the line being addressed by their title or Mr., and all officers of the staff are addressed by their title or Mr., as may be.

Line officers are appointed from the graduates of the U. S. Naval Academy. The grades of admiral and vice-admiral cease with the death of the present incumbents.

The active list of the navy is composed of 1 admiral, 1 vice-admiral, 7 rear-admirals, 13 commodores, 45 captains, 85 commanders, 74 lieutenant-commanders, 251 lieutenants, 79 lieutenants, junior grade, 76 naval cadets at sea, 201 naval cadets on probation at the Naval Academy, all of whom are officers of the line.

Of the staff there are 15 medical directors, 15 medical inspectors, 50 surgeons, 63 passed assistant surgeons, 14 assistant surgeons, 13 pay directors, 13 pay inspectors, 48 paymasters, 27 passed assistant paymasters, 19 assistant paymasters, 70 chief-engineers, 85 passed assistant engineers, 78 assistant engineers, 24 chaplains, 12 professors of mathematics, 1 secretary for the admiral and 1 for the vice-admiral, 10 naval constructers, 8 assistant naval constructers, and 10 civil engineers.

The warrant officers are 38 boatswains, 37 gunners, 51 carpenters, 27 sailmakers. There are 37 mates.

The active list is therefore composed of 820 officers of the line available for sea service, 580 officers of the staff, 155 warrant officers, 37 mates, and 201 naval cadets at the academy; total, 1793 officers of all grades. The retired list is composed of 156 line officers, 147 staff officers, 57 warrant officers; total, 360.

Officers are promoted in the U. S. naval service by seniority after an examination into their mental, moral, and physical fitness. Any officer of the navy on the active list below the grade of commander who, upon examination for promotion, is not found professionally qualified, shall be suspended from promotion for one year, with corresponding loss of date when he shall be re-examined, and in case of his failure upon such re-examination he shall be dropped from the service. The loss of *date* is reckoned from the *occurrence of the vacancy*, and the *year* of *suspension* from the *approval* by the President of the findings of the examining board.

Officers of the navy may be advanced at the discretion of the President, and by and with the advice and consent of the Senate, not exceeding 30 numbers, for eminent and conspicuous conduct in battle or extraordinary heroism. If the 30 numbers carry an officer into the next grade no further promotion shall take place, except for like cause, until the number is reduced to that provided by law.

No officer can be dismissed from the service except by order of the President or by sentence of a general court-martial, and in time of peace no officer shall be dismissed except in pursuance of the sentence of a general court-martial or in mitigation of a more severe punishment. No officer who has been dismissed by the sentence of a general court-martial, or suffered to resign in order to escape such dismissal, shall ever again become an officer of the navy. Congress does not mean by this to preclude the President from reappointing officers dismissed by sentence of court-martial to whom he has extended a pardon. Pardon purges the offence, but does not of itself restore lost position.

When any officer of the navy has been *forty years* in the service of the United States he may be retired from active service by the President upon his own application. Any officer below the grade of vice-admiral who attains the age of *sixty-two years* must retire, except lieutenant-commanders, lieutenants, lieutenants of the junior grade, ensigns, passed assistant surgeons, passed assistant paymasters, passed assistant engineers, assistant surgeons, assistant paymasters, and assistant engineers, who are not placed upon the retired list, except on account of physical or mental disability; also officers on the active list not below the grade of commander, who have, upon the recommendation of the President, received by name, during the civil war, a vote of thanks of Congress for distinguished services, shall not be retired, except for cause, until they have been *fifty-five years* in the service of the United States. Officers incapacitated for active service may be retired on the approval of a board, two-fifths of which are surgeons, unless such incapacity is not an incident of the service, in which case the officer may be wholly retired with one year's pay.

Officers on the retired list can only be employed on active service during war, when they receive the full pay of their grades. Officers when retired are placed on the retired list in the grades to which they belonged at the time of their retirement, and continue to be borne on the navy register. They are entitled to wear the uniforms of their respective grades, and are subject to the rules and articles for the government of the navy and to trial by court-martial.

Men.—Boys between the ages of 14 and 18 years (with the consent of their parents or guardians) may be enlisted to serve in the navy until they arrive at the age of 21; other persons may be enlisted to serve for a period of five years, unless sooner discharged by direction of the President. No one under 14 years, no insane or intoxicated person, and no deserter from the military or naval service of the United States can be enlisted.

"The number of persons who may at one time be enlisted into the navy, including seamen, ordinary seamen, landsmen, mechanics, firemen, and coal-heavers, and including 750 apprentices and boys, hereby authorized to be enlisted annually, shall not exceed 8250."

Men who have enlisted within the United States can be sent home, at the expiration of their enlistment, to some port on the Atlantic or Pacific coast, according to which coast they were enlisted on; but men enlisted without the limits of the United States may be discharged on the expiration of their enlistment either in a foreign port or in a port of the United States.

Honorable discharges for fidelity and obedience may be granted to seamen, ordinary seamen, landsmen, firemen, coal-heavers, and boys who have enlisted for three years, and if any of the above, being honorably discharged, reenlist for three years, within three months thereafter, he will be entitled to pay during these three months equal to what he would have been entitled to if he had been employed in actual service.

There is now no spirit ration, but in lieu thereof the navy ration is 30 cents per day, which is only allowed persons actually attached to and doing duty on board sea-going vessels, except petty officers, seamen, and ordinary seamen attached to receiving ships, or to the ordinary of a navy-yard and to naval cadets.

Pay.—The pay of an officer upon his original entry into the service, except where he is required to give an official bond, begins upon the date of his acceptance of his appointment; but when he has to give bond his pay commences upon the date of the approval of his bond by the proper authority. When promoted in course to fill a vacancy, the increased pay begins from the date he takes rank in the new grade, if it be subsequent to the vacancy he is appointed to fill. If an officer is kept away from examination for promotion on duty, and is afterwards examined and found qualified, the increased pay to which his promotion entitles him begins from the date when he would have been entitled to it had he been examined and found qualified by law or regulation, and his period of service in reckoning for longevity pay is considered to have commenced from the date when he was so entitled to take rank.

Pay.	At sea.	On shore duty.	On leave or waiting orders.
Admiral	$13,000	$13,000	$13,000
Vice-Admiral	9,000	8,000	6,000
Rear-Admirals	6,000	5,000	4,000
Commodores	5,000	4,000	3,000
Captains	4,500	3,500	2,800
Commanders	3,500	3,000	2,300
Lieutenant-Commanders:			
First four years after date of commission.	2,800	2,400	2,000
After four years from date of commission	3,000	2,600	2,200
Lieutenants:			
First five years	2,400	2,000	1,600
After five years	2,600	2,200	1,800
Lieutenants, junior grade:			
First five years	1,800	1,500	1,200
After five years	2,000	1,700	1,400
Ensigns:			
First five years	1,200	1,000	800
After five years	1,400	1,200	1,000
Naval cadets	500	500	500
Mates	900	700	500
Medical and pay directors, and medical and pay inspectors, and chief-engineers having the same rank at sea	4,400		
Fleet surgeons, fleet paymasters, and fleet engineers	4,400		
Surgeons, paymasters, and chief-engineers:			
First five years after date of commission.	2,800	2,400	2,000
Second five years	3,200	2,800	2,400
Third five years	3,500	3,200	2,600
Fourth five years	3,700	3,600	2,800
After twenty years	4,200	4,000	3,000
Passed assistant surgeons and passed assistant paymasters:			
First five years	2,000	1,800	1,500
After five years	2,200	2,000	1,700
Passed assistant engineers:			
First five years	2,000	1,800	1,500
Second five years	2,200	2,000	1,700
Third five years	2,450	2,250	1,900
Fourth five years	2,700	2,350	1,950
Assistant surgeons, assistant paymasters, and assistant engineers:			
First five years	1,700	1,400	1,000
After five years	1,900	1,600	1,200
Naval constructers:			
First five years	....	3,200	2,200
Second five years	....	3,400	2,400
Third five years	....	3,700	2,700
Fourth five years	....	4,000	3,000
After twenty years	....	4,200	3,200
Assistant naval constructers:			
First four years	....	2,000	1,500
Second four years	....	2,200	1,700
After eight years	....	2,600	1,900
Chaplains:			
First five years	2,500	2,000	1,600
After five years	2,800	2,300	1,900
Professors of mathematics and civil engineers:			
First five years	2,400	2,400	1,500
Second five years	2,700	2,700	1,800
Third five years	3,000	3,000	2,100
After fifteen years	3,500	3,500	2,600
Boatswains, gunners, carpenters, and sailmakers:			
First three years	1,200	900	700
Second three years	1,300	1,000	800
Third three years	1,400	1,300	900
Fourth three years	1,600	1,300	1,000
After twelve years	1,800	1,600	1,200

Prize money adjudged to captors after deductions for commander-in-chief is distributed among all doing duty on board and borne upon the books of the ship in proportion to their respective rates of pay in the service; but the commander of the ship is limited to one-tenth, even if the amount would exceed that if paid according to his rank.

An officer losing his clothing by the sinking of a vessel, not through his own negligence or want of skill or foresight, will be allowed not exceeding one month's pay, and petty officers, seamen, and others not officers are allowed not exceeding $60.

List of Vessels of the United States Navy.

Name and rate.	Propulsion.	Guns.	Displacement.	Station or condition.
Serviceable.			Tons.	
1*st-rate :*				
Tennessee	Screw.	22	4,840	Flag-ship, North Atlantic Station.
2*d-rates .*				
Powhatan	Paddle.	14	3,980	Special duty.
Trenton	Screw.	10	3,900	Flag-ship, Asiatic Sta.
Lancaster	“	10	3,250	Flag-ship, South Atlantic Station.
Brooklyn	“	14	3,000	North Atlantic Station.
Pensacola	“	16	3,000	Flag-ship, European Sta.
Hartford	“	14	2,900	Flag-ship, Pacific Sta.
Richmond	“	14	2,700	Repairing, Brooklyn.
Omaha	“	12	2,400	Asiatic Station.
Lackawanna	“	9	2,220	Navy-yard, Mare Island.
Vandalia	“	8	2,100	European Station.
Shenandoah	“	9	2,100	Pacific Station.
3*d-rates :*				
Juniata	“	8	1,900	North Atlantic Station.
Ossipee	“	8	1,900	Asiatic Station.
Quinnebaug	“	8	1,900	European Station.
Swatara	“	8	1,900	North Atlantic Station.
Galena	“	8	1,900	North Atlantic Station.
Marion	“	8	1,900	Asiatic Station.
Mohican	“	8	1,900	Pacific Station.
Iroquois	“	7	1,575	Pacific Station.
Kearsarge	“	7	1,550	European Station.
Adams	“	6	1,375	Pacific Station.
Alliance	“	6	1,375	North Atlantic Station.
Essex	“	6	1,375	Navy-yard, Brooklyn.
Enterprise	“	6	1,375	On return to U. S.
Nipsic	“	6	1,375	On return to U. S.
Monocacy (iron)	Paddle.	6	1,370	Asiatic Station.
Tallapoosa	“	6	1,270	South Atlantic Station.
Alert (iron)	Screw.	4	1,020	Asiatic Station.
Ranger (iron)	“	4	1,020	North Pacific.
Yantic	“	4	900	North Atlantic Station.
4*th-rates :*				
Michigan	Paddle.	4	685	Great Lakes.
Palos	Screw.	4 How.	420	Asiatic Station.
Pinta	“	2 How.	550	Pacific Station.
Despatch	“	....	560	Special service.
Thetis	“	1 How.	1,250	Out of commission, N. Y.
Torpedo rams :				
Alarm	Mallory propl'r	1	800	Out of commission, N. Y.
Intrepid	....	....	438	Altering, New York.
Requiring extensive repairs.				
1*st-rates :*				
Franklin	Screw.	22	5,170	Receiving-ship, N. Y.
Wabash	“	26	4,650	Receiving-ship, Boston.
Minnesota	“	25	4,700	Receiving-ship for boys, New York.
Iron-clad screw-vessels.				
Single-turreted monitors :				
Ajax		2	2,100	City Point, James River.
Canonicus		2	2,100	City Point, James River.
Comanche		2	1,875	Navy-yard, Mare Island.
Catskill		2	1,875	City Point, James River.
Jason		2	1,875	Navy-yard, Phila.
Lehigh		2	1,875	City Point, James River.
Mahopac		2	2,100	City Point, James River.
Manhattan		2	2,100	City Point, James River.
Montauk		2	1,875	Navy-yard, Phila.
Nahant		2	1,875	Navy-yard, Phila.
Nantucket		2	1,875	Navy-yard, Brooklyn.
Passaic		2	1,875	Naval Academy.
Saugus		2	2,100	Washington, condemned.
Wyandotte		2	2,100	City Point, James River.
Launched and requiring appropriations to complete.				
Double-turreted monitors :				
Amphitrite		4	3,815	Building, Wilmington, Delaware.
Monadnock		4	3,815	Navy yard, Mare Island.
Miantonomoh		4	3,815	New York.
Puritan		4	6,000	Chester, Pennsylvania.
Terror		4	3,815	Philadelphia.

List of Vessels of the U. S. Navy—Continued.

Name and rate.	Guns.	Displacement.	Station or condition.
Wooden sailing-vessels.		Tons.	
2*d-rates :*			
New Hampshire	16	4,150	Receiving-ship, Newport.
Vermont	7	4,150	Receiving-ship, N. Y.
3*d-rates :*			
Constellation	10	1,886	Practice-ship, Naval Academy.
Constitution	4	2,200	Portsmouth, N. H.
Independence	6	3,270	Rec'g-ship, Mare Island.
Monongahela	2	2,100	Store-ship, Pacific Sta.
Portsmouth	12	1,125	Training-ship.
Jamestown	12	1,150	Training-ship.
Saratoga	12	1,025	Training-ship.
St. Louis	....	830	Receiving-ship, Phila.
St. Mary's	8	1,025	Public Marine School, New York.
Dale	8	675	Rec'g-ship, Washington.

Screw-Tugs.—Catalpa, Nina, Cohasset, Rescue, Fortune, Rocket, Leyden, Speedwell, May Flower, Standish, Monterey, Triana, Nellie.

VESSELS.—The United States possess no armored sea-going ship, no modern high-powered cruising vessels, and no armaments of modern rifled guns. The small single-turreted monitors, armed with smooth-bore guns, might be of some use as harbor-defence vessels, but could not do any valuable service at sea. The unfinished double-turreted monitors will make fairly good coast-defence vessels, and Congress is now considering the advisability of completing them. These monitors are intended to carry modern breech-loading high-powered rifles. The Miantonomoh is armored with wrought-iron side armor 7 inches thick amidships; the others having no side armor as yet, will be provided with steel or compound armor.

The unarmored wooden ships of the first rate may be looked upon as fine specimens of the extinct trade of wooden shipbuilding for war, and were in their day an honor to the country.

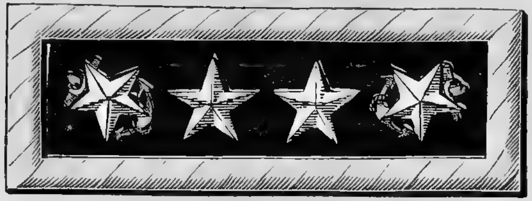
The second- and third-rate wooden steamers are some of them very valuable, useful, and, *while in repair*, economical cruisers for doing police duty in time of peace, but with few exceptions they have little or no fighting efficiency, not having speed enough to run away, nor guns with range and power enough to fight. The Trenton, however, is an excellent specimen of a first-class wooden corvette. She has a 3-cylinder compound engine, developing 3100 indicated horse-power, giving a speed of 14 knots. The armament consists of eleven 8-inch muzzle-loading rifles converted from smooth-bores, and four light guns for saluting purposes. Four of the rifles are mounted on each broadside of the gun-deck, two on the bow on the spar-deck, and one as stern-chaser on the spar-deck aft.

The navy will soon have added to it the Chicago, Boston, Atlanta, and Dolphin. These ships are all built of steel and will be useful and needed additions.

The Dolphin is a despatch-boat of 1520 tons displacement, 240 feet long, 32 feet beam, and 14 feet 5 inches mean draught. She is to carry one 6-inch breech-loading rifle, firing a 100-lb. shell, and four revolving cannon. This vessel has not yet been accepted by the department. It seems she has made the required speed, but has not developed the required horse-power. Doubts were cast upon her structural strength, but they have not been confirmed up to the present, though the ship has been in some rough weather. Cost of hull, machinery, and fittings $315,000.

The Chicago is a bark-rigged, protected steam-cruiser, built of mild steel, and carries high-powered engines and best types of modern guns. The battery consists of four 8-inch breech-loaders, weighing about 12 tons each, mounted in projecting half-turrets on the spar-deck. The men are protected by shields on the

SHOULDER STRAPS
FOR
LINE OFFICERS
OF THE
UNITED STATES
NAVY.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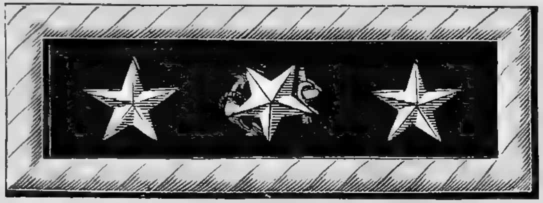
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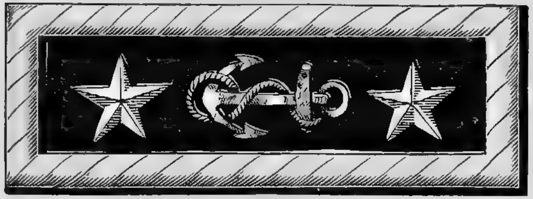
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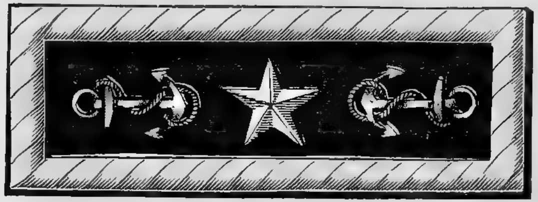
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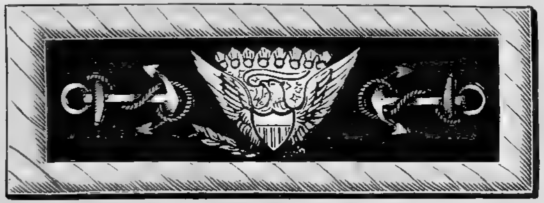
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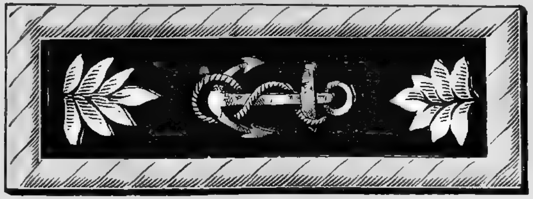
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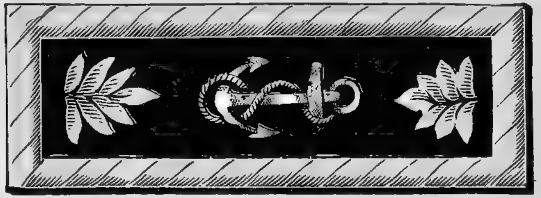
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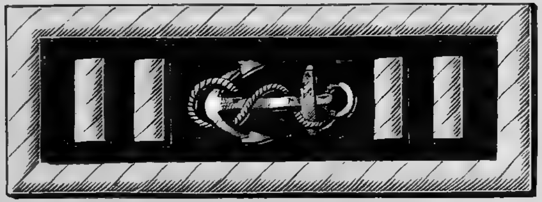
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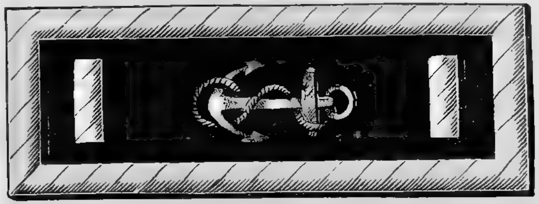
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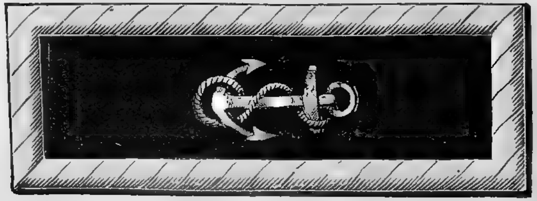
ENSIGN.

guns. Six 6-inch breech-loading rifles are to be mounted in broadside on the gun-deck, with a train of 60° before and abaft the beam. One 6-inch rifle will be mounted in a recessed gun-deck, port on each bow, with a train of 3° across the bow to 52° abaft the beam. Two 5-inch rifles in recessed ports abaft the captain's cabin complete the main battery. The weight of the 8-inch projectile is 250 lbs.; 6-inch, 100 lbs.; 5-inch, 60 lbs. There will be in addition four 47-mm. and two 37-mm. Hotchkiss revolving cannon mounted in bullet-proof towers. The crew will number 300 men.

There is a double bottom in wake of the engines and boilers divided into 14 water-tight cells. There are 9 transverse bulkheads dividing the ship into 10 main water-tight compartments.

The machinery and boilers are covered by a protective steel deck $1\frac{1}{2}$ inches thick. It bends down at the sides, striking them at 4 feet below the water-line.

She is to be driven by twin screws at a sea-speed of 14 knots. The screws are driven by two cylinder, compound, overhead beam-engines. There are six double-ended, horizontal, return-tubular, externally-fired boilers, carrying a working pressure of 100 lbs. With a total supply of 1240 tons of coal she can steam 3000 miles at 15 knots and 6000 miles at 10–11 knots. She has two-thirds sail-power—the area of plain sail being about 14,880 square feet. The cost for hull, machinery, and fittings is $889,000.

The Boston and Atlanta are alike. They have a central superstructure, leaving the ends clear and unobstructed. Outside the forward port angle and the after starboard angle of the superstructure 8-inch rifles will be mounted in barbettes about 3 feet high and 2 inches thick. Within the superstructure six 6-inch rifles will be mounted, two on each broadside; one forward in the starboard angle of the superstructure and one aft in the port angle. They will also carry eight revolving cannon. They are propelled by single screws driven by 3-cylinder, compound, horizontal back-acting engines of 3500 horse-power—estimated sea-speed, 13 knots. With a total supply of coal of 780 tons they can steam 2500 miles at full speed or 5300 miles at about 10 knots. The rig is that of a brig to topgallant sails, making a sail spread of 10,400 square feet. Complement of men 230. Cost of each $618,000.

Colors, Distinctive Flags, and Pennants.—The ensigns of U. S. naval vessels, when at anchor, are hoisted at 8 A. M. and kept flying till sunset. Whenever a vessel gets under way or comes to anchor the colors are hoisted; also when meeting any vessel of the navy, or falling in with any vessel at sea or passing forts, batteries, castles, light-houses, or towns. Ships' boats are required to hoist their ensigns when they shove off from the vessel to which they belong, and keep them flying till their return alongside.

Distinctive blue flags, with four, three, and two white stars, are worn at the main, fore, and mizzen by admirals, vice-admirals, and rear-admirals, respectively; but when two or more admirals of the same grade meet, the senior wears a blue, the next a red, and the others wear white flags. Commodores have a broad blue pennant, with one white star, which is worn at the main when the commodore is acting as commander-in-chief; when two or more meet, the senior only wears a blue, the next a red, and the others white pennants. Any officer commanding a vessel, except one on board of which a flag or broad pennant may be worn, shall wear a narrow pennant at the main. Commanding officers of and above the grade of lieutenant-commander wear, on a staff at the bow of their boat, a similar flag or pennant to what they are entitled to wear at the mast-head of their respective vessels, but no divisional flag is to be worn in the bow of a boat. To tell what officers are in boats, commanding officers of fleets, squadrons, or divisions carry the distinguishing marks of their ranks painted on the bows of their boats, captains have a gilt ball at the end of their boat-staffs, and commanders a gilt star. When powder is being taken aboard a red flag is hoisted at the fore, and when the men are at meals a red pennant is hoisted at the end of the cross-jack yard. A yellow flag is the quarantine flag. Flags of truce are white, and on water are met at suitable distance by a boat or vessel from the senior officer's vessel, in charge of a commissioned officer, having a white flag displayed from the time of leaving till her return. Where a flag of truce is admitted, the ensign is hoisted and a white flag at the fore on board the senior officer's vessel, when no engagement is in progress, and kept flying till the flag of truce from the enemy has returned within his lines.

Uniform.—The *special full-dress* coat is of dark navy-blue cloth, double breasted, with two rows of large navy buttons on the breast, 9 in each row, a standing collar hooking at the bottom. The collar has one strip of gold-embroidered white oak leaves for the admiral and vice-admiral, a strip of navy gold lace one inch wide around the top and down the front for rear-admirals, commodores, captains, and commanders, $\frac{1}{2}$ inch wide for lieutenant-commanders, lieutenants, and ensigns. Shoulder attachments for epaulets are to be provided. All staff officers wear the same coat and the same width of gold lace as prescribed for line officers, with whom they have relative rank.

The *full-dress coat* is of dark navy-blue cloth, of the same general cut as a civilian's evening dress, having 5 large navy buttons on each breast, 2 at the waist behind, and 1 at each fold. Shoulder attachments for epaulets to be of cloth and silk neatly laid on.

The *frock coat* is of dark navy-blue cloth, with two rows of 9 buttons each on the breast. A metallic hook covered with cloth is placed over the left hip to support the weight of the sword.

The *service coat* is a sack coat made of dark navy-blue cloth, shaped to the figure, buttoning close up with a "fly" front and a slit over each hip, 5 inches on the right side and extending to the lower edge of the sword-hilt on the left side. The collar edges of the coat, side seams of the back from the shoulder to the lower edge of the skirt, and the edges of the hip slits are trimmed with lustrous black braid $1\frac{1}{4}$ inches wide, laid on flat, besides which, at a distance of $\frac{1}{8}$ inch with an overhand turn $\frac{3}{8}$ inch in diameter at each change of direction, a narrow silk braid $\frac{1}{8}$ inch wide will be placed. On each side of the collar the corps badge and grade device are embroidered. The grade mark on the sleeve is a double thickness of lustrous black braid, showing the same width and disposition as that of the gold lace worn on other coats. In warm weather a similar coat made of white linen duck trimmed with white braid, but without collar devices, is worn.

Full-dress trousers for all commissioned officers are dark navy-blue and have a width of gold lace down the outer seam, the same as on the collar of the full-dress coat. For naval cadets the lace is $\frac{1}{4}$ of an inch wide.

The overcoat is an ulster of dark navy-blue, with wide rolling collar, large gutta-percha buttons, outside pockets in each breast, and an up-and-down slit on the left hip large enough to admit the sword-hilt. The cravat is a black-ribbed silk, tied with a double bow-knot. The shirt-collar must always be white, and standing collars must be worn with the special full-dress and the service coat.

Sleeve ornaments—On special full-dress coats of admirals. For the admiral three strips of gold-embroidered white oak leaves, strips 1 inch wide and $\frac{1}{2}$ inch apart. For the vice-admiral two strips of oak leaves. For rear-admirals one strip of 2-inch gold lace, with a strip of $\frac{1}{2}$-inch gold lace above it.

On full-dress and frock coats of admirals. For the admiral one strip of 2-inch lace, with three strips of $\frac{1}{2}$-inch lace above. For the vice-admiral one strip of 2-inch, with two strips of $\frac{1}{2}$-inch. For rear-admirals one strip of $\frac{1}{2}$-inch lace above the 2-inch.

Commodores one strip of 2-inch gold lace.

Captains four strips of $\frac{1}{2}$-inch gold lace set $\frac{1}{4}$ inch apart.

Commanders three strips, lieutenant-commanders two and a half strips, the half in the middle. For lieutenants two strips, junior lieutenants one and a half strips, ensigns one strip, naval cadets at sea one strip of $\frac{1}{4}$-inch lace, broken with dark-blue silk at intervals of 2 inches.

All staff officers will wear the same strips of lace as prescribed for line officers of the same relative rank, with bands of colored cloth between the strips of gold lace as follows: *Medical officers*, dark maroon velvet; *pay officers*, white cloth; *engineer officers*, red cloth; *naval constructers*, dark-violet cloth; *professors of mathematics*, olive-green cloth; *civil-engineers*, light-blue velvet.

Line officers (including mates, boatswains, and gunners) wear a gold star on the sleeve above the lace strips.

All commissioned officers wear gold bullion epaulets on each shoulder. Naval cadets at sea wear shoulder-knots in lieu of epaulets. Shoulder-straps are worn by commissioned officers and are 4¼ inches long and 1½ wide. The centre is of dark navy cloth, and upon it is embroidered the corps and rank device as follows:

Admiral, four silver stars with gold foul anchors under the outer two stars; vice-admiral, three stars with one gold foul anchor; rear-admiral, four stars with an anchor between; commodore, one star with a silver foul anchor at each end; captains, a silver spread-eagle with anchor at each end; commanders, silver oak leaf at each end with a foul anchor between; lieutenant-commanders, gold oak leaves at each end with anchor between; lieutenants, two silver bars at each end with anchor between; junior lieutenants, one silver bar at each end with anchor between; ensigns, a silver foul anchor in the centre; naval cadets at sea, a gold foul anchor on shoulder-knot.

Staff officers wear on the frog of the epaulet and in the centre of the shoulder-strap the same rank devices as prescribed for line officers of similar rank, substituting the proper corps device for the foul anchor. *Medical corps*, gold spread oak leaf with silver acorn on it; *pay corps*, a silver oak sprig; *engineer corps*, four silver oak leaves; *construction corps*, a gold sprig of two oak leaves and an acorn; *chaplains*, a silver Latin cross; *professors*, a silver oak leaf and acorn; *civil-engineers*, the letters 𝕮 𝕰 in silver; *secretaries*, the letter 𝕾 in silver.

Boatswains, two silver foul anchors crossed after 20 years' service, under 20 years they are gold; *gunners*, under 20 years gold spherical shell, over 20 years silver shell; *carpenters*, under 20 years gold chevron, over 20 years silver chevron; *sail-makers*, under 20 years a gold diamond, over 20 years silver diamond; *mates*, under 20 years gold binocular glass, over 20 years silver binocular; *pay clerks*, the corps device of the pay corps, embroidered in gold.

All commissioned officers wear a rigid chapeau, or cocked hat. The service cap is of dark-blue navy cloth, with visor sloping down, having a gold lace strap. All commissioned officers and naval cadets at sea wear on the front of the cap a silver shield, emblazoned paleways of thirteen pieces, with a chief strewn with stars surmounted by a silver spread-eagle, the whole placed upon two crossed foul gold-embroidered anchors. Warrant officers, mates, and pay clerks have two crossed gold foul anchors. There is also a white cork helmet to be worn in warm weather.

Swords are not less than 26 or more than 32 inches long, half-basket hilt, white grip, scabbards of black leather, and mountings of yellow gilt. With the sword is worn a sword-knot of gold lace with bullion tassel. There are two kinds of sword-belts, one a plain leather one with gilt plate and clasps, the other of cloth embroidered with gold leaves or stripes.

Naval Hospitals and Homes.—Every officer, seaman, and marine in the navy has 20 cents per month deducted from his pay as a fund for the maintenance of the navy hospitals; and all fines imposed on navy officers, seamen, and marines go to this fund. A permanent naval asylum is now located at Philadelphia, for disabled and decrepit navy officers, seamen, and marines, presided over by a commodore. There are naval hospitals at Chelsea, Mass., Brooklyn, Philadelphia, Washington, Norfolk, and Mare Island. These hospitals are allowed one ration per day for the maintenance of every officer, seaman, or marine admitted, which is deducted from their respective accounts; and if any of them are entitled to a pension this pension is paid in to the navy department during the pensioner's continuance in the hospital, and deducted from his account. An army and navy hospital has been built at the Hot Springs, Ark., in accordance with plans prepared by the surgeons-general of the army and navy. There is in the District of Columbia a government hospital for the insane. There are national homes for volunteer soldiers and sailors who have been disabled by wounds received or sickness incurred in the line of their duty, at Augusta, Me., Milwaukee, Wis., Dayton, Ohio, Knightstown, Ind., and Hampton, Va.

Institutions.—The U. S. Naval Institute was established in 1873, with the object of advancing professional and scientific knowledge in the navy. The institute has no official connection with the navy department other than having a paymaster detailed as treasurer. Papers and communications upon subjects of interest to the naval profession are contributed by the members and others, and reprinted, from various sources, the whole being published quarterly in the *Proceedings* of the institute.

The institute consists of regular, life, honorary, and associate members, regular members being officers of the navy, marine corps, and civil officers attached to the naval service. Honorary members are selected from distinguished naval and military officers and from eminent men of learning in civil life. Associate members are elected from officers of the army, revenue marine, foreign officers of the military and naval professions, and from persons in civil life interested in the purposes of the institute. Each year a prize is offered for the best essay on some professional subject, the prize essayist being made a life-member of the institute. Inventors of articles connected with the naval profession are afforded opportunities of exhibiting and explaining their inventions, and descriptions of such inventions as are deemed of use to the naval service are published in the *Proceedings.*

The Navy Mutual Aid is a kind of mutual life insurance company formed by the officers of the navy. Members joining pay an entrance fee. On the death of a member graded assessments are levied on all the members, and the amount so realized goes to the beneficiaries of the deceased.

MARINE CORPS.

Grades.	Pay per annum.
Colonel commandant	$3,500
Colonel	3,500
Lieutenant-colonel	3,000
Major	2,500
Captain and assistant quartermaster	2,000
Captain	1,800
First-lieutenant	1,500
Second-lieutenant	1,400

The marine corps is subject to the laws and regulations governing the navy. Marines stand guard and sentinel duty and act as orderlies on board ship, and, when not on such duties, they are made to work the same as the seamen, though they are never sent aloft. The corps at present consists of 85 commissioned officers, 384 non-commissioned officers, 30 musicians, 96 drummers and fifers, and 1500 enlisted men; total, 2095.

Every period of five years in a grade increases the pay 10 per cent., the total amount of increase not to exceed 40 per cent. of the current yearly pay. Retired officers receive 75 per cent. of their pay at the time of their retirement. Privates are paid $13 per month during the first five years' service, increasing to $20 after twenty years.

In the preparation of the above the following have been consulted: *Laws Relating to the Navy*, Hogg; *U. S. Naval Regulations; Seamanship*, Luce; *Navy Register; Proceedings U. S. Naval Institute*, and current publications.

(L. N.)